Commonwealth of Kentucky

Exchange 2003 Global Address List Synchronization Design and Implementation

Version 1.4
1/2/2008

The purpose of this document is to provide an interested Commonwealth of Kentucky (COK) government entity that is compliant with all stated qualifications listed in this document, the necessary information to procure, install and configure the necessary hardware and software to successfully automate the synchronization of their Exchange 2003 Global Address List with other participating COK entities and to achieve a fully automated solution for keeping all participating GAL's across the Commonwealth up-to-date.

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Project Background

Most, if not all, business entities within the Commonwealth of Kentucky (COK) utilize Microsoft Exchange 2003 as their enterprise e-mail platform. Most entities within the Executive branch of Government utilize the services of the Commonwealth Office of Technology's Exchange implementation for their e-mail needs, while members of the Legislative, Judicial and Department of Education all implement and manage their own instance of Exchange (their own Organization) within their own Active Directory forest.

Most branches of Government implement separately due to the foundations upon which separation of Government principles are founded on and to provide an ultimate boundary for the purposes of data security. Although this separation brings with it many operational advantages, one of the issues that arise as a by-product of multiple instances of Exchange in different Organizations is that there are multiple Global Address Lists (GAL's) that are not automatically synchronized and kept up-to-date with changes in Commonwealth personnel.

Under Exchange 5.5, the synchronization of GAL data was performed by a series of manual export / data massage / import routines that were left to each entity to perform for themselves at their own discretion. These imports were cumbersome, time-intensive, and often prone to errors in either operation or data validity. Factor in that each agency performed their own export/import cycle on their own schedule, and the problem of data concurrency and validity becomes an issue.

Once all entities moved to Active Directory and Exchange 2003, the problem, as stated above, was not resolved via new features of either product. All entities moved to offering their GAL data in updated formats so that other entities could 'swap' GAL information under the new environment and Since Exchange 2003 now relies solely on Active Directory for its directory data, updating the GAL became an exercise in updating Active Directory. Unlike Exchange 5.5, the tools for doing so are not as intuitive to use and the data formats used are not as easily (and uniformly) manipulated as they were in Exchange 5.5.

Although there have been some scripted import/export processes put in place in different entities, there is no current enterprise approach to solving the GAL synchronization problem in a manner that is consistent, timely, automated and concise. The goal of this project is to address these concerns with a solution that provides for an enterprise approach to synchronizing the Global Address Lists across the Commonwealth of Kentucky.

Business Value

Business valuation on a solution such as this is probably best measured by the impact within each entity by them not having to manage this process (and data) going forward and the Global Address Lists across each entity staying consistent and uniform. Once each entity enrolls in the 'GALSync' process, cross-entity messaging within the Commonwealth will enjoy a much higher level of address list concurrency with personnel changes (additions, changes, deletions from the entity GAL) being reflected in the other entities GAL within days rather than months.

The other benefit from this is that each entity will be able to control what data is published to each 'subscribing' entity and will be able to exercise a fine level of control over how their publishing data appears to other entities. This also lends itself to standardization and provides a way for each entity to continue to publish their respective GAL data without having to worry about individual processes for importing/exporting with other entities due to messaging system versioning differences within the Microsoft platform stack.

Solution Scope

The scope of this solution is bounded by the fact that enterprise GALSync is implemented via a localized implementation of a 'GALSync' server that synchronizes your entity's data with a centralized (nonpartisan) instance of Active Directory that serves as a repository for other entities to read (but not update) your entity's data while your entity is able to read (but not update) other entity data. It is your GALSync server that does the work of updating the GAL with the data in this nonpartisan Active Directory forest and the configuration allows for the synchronization of as little (or as much) data from other entities to your GAL.

COT maintains the nonpartisan forest hardware and performs the operational duties to keep the forest functional, available and protected from disaster (performing backups, patching, etc.) and is a user of the solution in much the same way as everyone else.

This document details the overall structure of the enterprise solution and details the necessary hardware and software components that are necessary to implement this solution. The setup and configuration are also detailed.

Note

Any custom business requirements that your entity may have cannot be covered via a general setup and configuration of the GALSync software, and those advanced configurations are left to you to configure. This document explains how to perform 'whole-environment' GALSync with other entities within the Commonwealth and if there is a need to customize this behavior then advanced configuration (which is outside the scope of this document) will be required.

Business Requirements

This solution was comprised for all participating state entities, with special input from the Commonwealth Office of Technology (COT), the Kentucky Department of Education (KDE) and the Legislative Research Commission (LRC). All three parties contributed their own unique business requirements to the overall solution and were very gracious in participation on the project to help ensure that the as-delivered solution was flexible enough to accommodate some very advanced business requirements that needed to be represented in the synchronization process.

The primary business requirement, being common between all of the aforementioned entities, is being able to exchange e-mail-related addressing information with other COK entities on a regular basis in an automated fashion that allows their own address lists to stay current.

Specific business requirements that each entity has described as being business-critical are noted below:

Commonwealth Office of Technology (COT)

- Distribution list membership cannot be altered (user removed/re-inserted) when a modification to a member of the list is processed.

Kentucky Department of Education (KDE)

- Requires the ability to filter specific recipient types (namely students from school districts) from synchronization.
- Distribution list membership cannot be altered (user removed/re-inserted) when a modification to a member of the list is processed.

Legislative Research Commission (LRC)

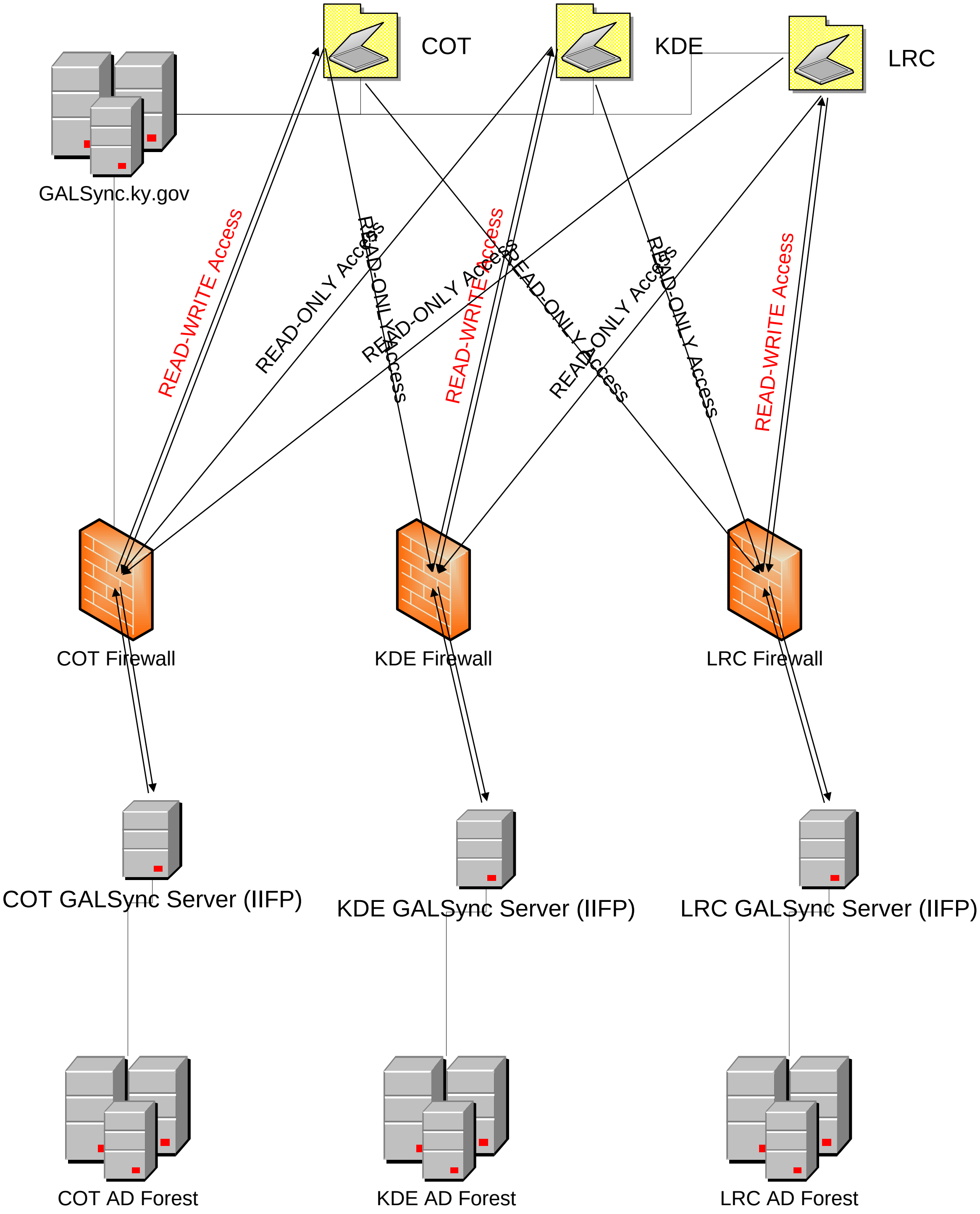
- Distribution list membership cannot be altered (user removed/re-inserted) when a modification to a member of the list is processed.

Additional Entities

- To be determined (and configured) by the entity themselves.

Solution Architecture

The overall solution architecture is based around a ‘subscriber/publisher’ model that each participating entity follows. The depiction of the logical architecture is shown below:



The Executive Branch's Commonwealth Office of Technology (COT) will provide and maintain the GALSync forest. This forest will only contain the synchronized contacts of the participating entities and should not contain any sensitive information from any participating entity (as long as the synchronization configuration guidelines are followed).

Each participating entity will have their own IIFP/SQL server that serves as their 'GALSync' server. This server will make an outbound connection through their firewall, and connect to the 'GALSync' forest that resides in the COT DMZ (E-Gov) zone.

Each entity will be provided with a GALSync forest service account that will have read-write permissions on the entity OU where all mailbox-enabled users are written to and will have read-only access to all non-entity OU's (other governmental participants) where the GALSync server will be configured to read in all mailbox-enabled users that have been exported from other entities. The advantage of this method is that each entity is capable of configuring who they want to see in their own GAL and can add/remove other entities at will. Each entity will also have only enough permissions to update *their own* data in the GALSync forest and no permissions to update anyone else's data.

Due to the fact that all GALSync data resides in a common and secured forest, there is no need for any participating entity to allow connectivity from any other entity through their own firewall, as all connections for GALSync are originated from within the participating entity outbound to a common location, and no inbound connections are required or should be configured specifically for this solution.

This also allows an entity to participate when they want, and how often they want (recommended guidelines are listed in this document) without impacting any other participating entity.

Note

Although COT, LRC and KDE are commonly-referenced in this documentation, the solution is architected such that any approved agency can participate in the GALSync process. This process is not unique to the agencies listed above, and they are used for representative purposes only.

The 'subscriber/publisher' model is simply repeated once per additional entity that participates in GALSync.

Solution Requirements and Responsibilities

This section details what will be required, from an entity perspective, to quality for the GALSync service and install, run and manage the GALSync server.

Responsibilities

- **COT Responsibilities** - COT will be responsible for the implementation of the first IIFP server and staging forest that all participants will use to house their contacts which includes any hardware and software costs. COT will maintain the hardware and software to insure proper functionality of the GALSync forest's domain controllers and will make every reasonable effort to ensure the continuous availability of the services they provide.
- **Participants Responsibilities** - All participants understand that they are responsible for acquiring their own GALSync server and any performing any configuration that will be required to successfully participate in the GALSync program. The entity will be responsible for any support required to implement this solution as well as any on-going support that may be required to ensure the proper long-term functionality of their GALSync server. This includes, but is not limited to the day-to-day server operations, backup and restoration of the IIFP database, GALSync server configuration, backup and restoration of the entity Active Directory database before performing the initial synchronizations. COT will not be responsible for the validity of data in each entities forest, either on the import, synchronization or export of said data to and/or from the GALSync forest.

Qualifications

The qualifications to participate in GALSync are as follows:

- An entity's GAL is their property and the use of it by someone else needs to be approved by the proper management of that entity.
- An entity needs to be part of the Commonwealth's network which has been referred to as "The Kentucky Information Highway" per KRS 45A.605.
- Completion and submittal of the "GAL Synchronization Letter of Acknowledgement" (included in Appendix A of this document) to COT for approval and GALSync forest service account creation
- An identified entity contact who will serve as the 'point contact' for all items related to GALSync for that entity between themselves and COT.
- The ability to legally dispose of the following information about all users who will be synchronized to other entities via the GALSync process:
    - First Name
    - Last Name

  - Display Name
  - E-mail alias
  - Work Address
  - Work City
  - Work State
  - Work Zip Code
  - Title
  - Company
  - Department
  - Office
  - Work Phone
  - Work E-mail Address

Environmental

- Active Directory running in Windows 2003 forest and functional mode is a recommendation, but not a requirement.
- Exchange 2003 schema extensions and Exchange 2003 operational (prior versions of Exchange are not supported for GALSync)
- One external IP address (static) on the external interface of the entity firewall that the GALSync server will always 'appear' to be coming from.

Hardware

The GALSync server is to be a single, stand-alone server. No components of the solution are to be clustered or spread across multiple servers. Due to the nature of the synchronization schedule, a well-equipped virtual machine may be the proper (and economical) choice for many entities to implement this solution on.

The server should also have a gigabit/GB (recommended) or 100mb/sec (minimum) network connectivity. If possible, locate the GALSync server as close (subnet-wise) to the most Active Directory domain controllers it will be communicating with so as to minimize router hops and maximize network communications.

Since the GALSync server resides on the entity internal network, IP addressing and other related requirements are at the responsibility of the entity.

Although this documentation recommends a physical server for performance and supportability, a virtual machine is also a very viable option. Recommended configurations for both are given below:

Physical Hardware

- Server-class hardware with 2 or more Pentium 4 Xeon CPU's, 3Ghz or higher (2 or more dual-core CPU's recommended, 2 Ghz or higher if possible)
- 4GB RAM (more if possible)
- Hardware RAID controller with the following spindle arrangement:
    - 1 RAID-1 array dedicated for the operating system, IIFP and SQL Server binaries, temp directories and page file.
        - This should be the 'C:' drive
    - 1 RAID-1 array dedicated for the SQL Server Transaction logs
        - This should be the 'D:' drive
        - Ensure that the stripe size is 64K or larger
    - 1 RAID-1 or RAID-5 array dedicated for the SQL Server database files
        - This should be the 'E:' drive
        - Ensure that the stripe size is 64K or larger
    - 1 RAID-1 or RAID-5 array dedicated to database backups and the tempdb database/logs
        - This should be the 'F:' drive
    - Assign the CD-ROM/optical drive to be 'Z:'

Note

Each RAID array should be serviced by dedicated spindles, if possible. Combining spindles will create I/O contention and will lead to degraded performance

Virtual Machine

- Configure dual-CPU support in the VM, if possible
- Configure 4GB of RAM (or more, if possible)
- Create multiple, dedicated virtual hard disk files for each of the 4 volumes, described above, that will be needed by the VM. Try to locate these hard drive files on separate physical spindles on the host machine, if possible, to reduce I/O contention. If the VM is being back-ended by a SAN, then most I/O problems will likely be minimized by the SAN controller(s), but the same logical layout (and dedicated SAN disks, if possible) should be followed for consistency's sake.

Note

Note that the IIFP will work fine in a virtual machine, but is not currently "supported" by Microsoft Product Support Services (PSS). If you have a need to call PSS in regards to an operational issue with your IIFP server, then know ahead of time that PSS may "make" you move the IIFP to a physical server before they offer support.

Note

If you have more than 4GB of RAM available to the physical machine or virtual machine, SQL can be configured to take advantage of it via PAE and AWE, so don't let 4GB be an artificial ceiling for RAM for the IIFP server. Although Windows and IIFP won't make direct use of the memory, the IIFP will indirectly benefit from the memory due to SQL being able to take advantage of the larger memory set. Note that there are additional configuration steps that need to be taken in order for Windows and SQL to use this memory over 4GB, but those configuration steps will be included in the final documentation.

Software

- Microsoft Windows Server 2003 (Enterprise Edition) with SP2 and all applicable hotfixes **(32-bit edition)**
- Microsoft .NET Framework 2.0 and post-RTM hotfixes
- Microsoft SQL Server **(32-bit edition)**
  - 2000, Enterprise Edition, Standard Edition, or Developer Edition, with Service Pack 3a (SP3a) or higher (SP4 recommended)
  - 2005, Enterprise Edition, Standard Edition, or Developer Edition with Service Pack 1 or higher (SP2 recommended)
- Microsoft Identity Integration Feature Pack (with SP2 integrated) – available at: http://www.microsoft.com/downloads/details.aspx?familyid=d9143610-c04d-41c4-b7ea-6f56819769d5&displaylang=en

Operational

The intent of the solution is to be 'automatic' once it is fully configured (per this document) and verified to be working correctly. That being said, there will still be a need for someone within the agency to 'own' the GALSync process and the management of the server (patching, availability, etc.). the GALSync server should not require much, if any, day-to-day care and feeding, but the service owner should periodically check the server to verify proper operation and resolve any errors that may be outstanding and to perform any required manual synchronizations in due course of troubleshooting, etc.

The GALSync server owner will have the ability to delete any and all contacts in their own forest that are synchronized from the GALSync forest (other agencies) but will not have the ability to delete their own contacts unless they coordinate with COT and/or use a tool (outside of the IIFP) to do so (ldp, etc.), so plan your first synchronization carefully because the cleanup of such will be tedious!

GALSync Server Installation and Configuration

This section details the steps necessary to install and configure the appropriate software to ensure that your agency GALSync server operates and interacts with the other agency information correctly. Step-by-step procedures are included where deemed necessary (and outside the scope of 'normal' OOB (out-of-box) configurations).

This section also assumes that you have the hardware (or virtual machine) configured appropriately, as per the previous section.

Note

Throughout this section of the document, the phrase 'complex password' is used to denote a password that meets the following requirements:

A Minimum length of 8 characters
Comprised of upper and lower-case alphabetic characters (A-Z; a-z)
Comprised of numeric characters (0-9)
Comprised of special characters (punctuation, spaces, symbols, etc.)

Server Operating System

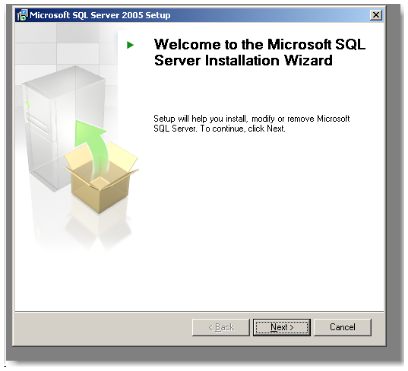
1. Install Windows 2003 R2 Enterprise edition (32-bit) onto the C: volume and accept all defaults during the installation. If you are not using a 'SP2-integrated' version, then install Windows 2003 SP2 immediately after the server completes the build process.
    a. Install any additional components (SNMP, etc.) that may be needed for your environment.
2. Install the .NET Framework 2.0
3. Install all applicable hotfixes (be sure to also install the .NET Framework 1.1 hotfixes, along with the .NET Framework 2.0 hotfixes)
4. Ensure that the network connection is operating at the highest possible frame rate
5. Ensure that terminal services (RDP) has been enabled in remote administration mode
6. Reassign the drive letter of the CD/DVD-ROM to be Z:, then proceed to format the D:, E: and F: volumes with NTFS
7. Join this GALSync server to the root domain of your forest (or whichever domain you wish the contacts to be stored in. This text assumes that location to be the root domain of the forest).

SQL Server

Note

Perform the following while being logged on as a server administrator.

1. Insert the SQL 2005 Standard Edition CD (or mount an ISO image) and proceed to allow the setup program to install the native client and setup support files.
2. The setup wizard will then continue and inspect the server configuration. Click [Next] to continue through the wizard:



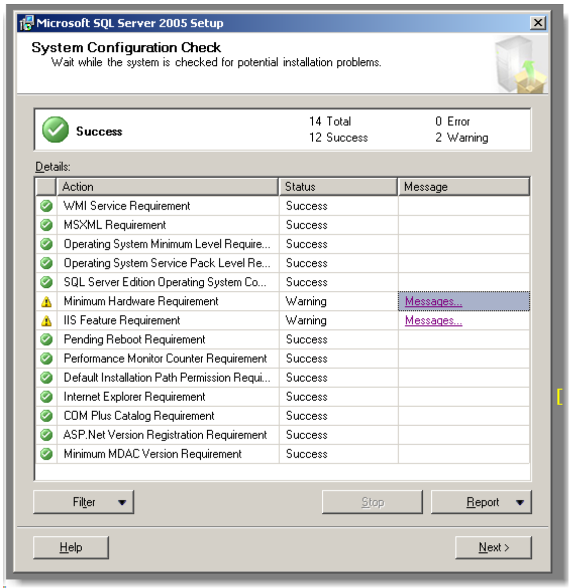
Microsoft SQL Server 2005 Setup

Welcome to the Microsoft SQL Server Installation Wizard

Setup will help you install, modify or remove Microsoft SQL Server. To continue, click Next.

3. The following dialog will test the server prerequisites for installing SQL 2005. Note that although IIS isn't required for this implementation, if you wish to leverage SQL Reporting Services at some point in the future to write reports against the MIIS database, then you should stop now, install IIS, and then re-run this setup program so that the SRS component will install correctly.

   Also note that since this installation is happening in a VM environment, the hardware requirements will almost always be flagged. This is of no concern as long as you are confident that the VM is configured correctly (with enough RAM).



Microsoft SQL Server 2005 Setup

System Configuration Check

Wait while the system is checked for potential installation problems.

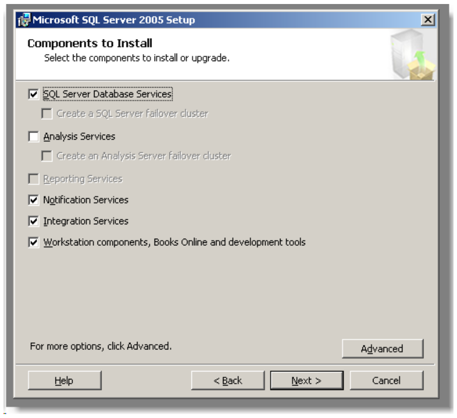
Success 14 Total 12 Success 0 Error 2 Warning

Details:

Action	Status	Message
WMI Service Requirement	Success	
MSXML Requirement	Success	
Operating System Minimum Level Require...	Success	
Operating System Service Pack Level Re...	Success	
SQL Server Edition Operating System Co...	Success	
Minimum Hardware Requirement	Warning	Messages...
IIS Feature Requirement	Warning	Messages...
Pending Reboot Requirement	Success	
Performance Monitor Counter Requirement	Success	
Default Installation Path Permission Requi...	Success	
Internet Explorer Requirement	Success	
COM Plus Catalog Requirement	Success	
ASP.Net Version Registration Requirement	Success	
Minimum MDAC Version Requirement	Success	

Click **[Next]** when ready and enter in the agency name and Product Key when prompted and click **[Next]** again to proceed to the component selection dialog.

4. Enable the components for installation, as shown below, and click **[Next].**



Microsoft SQL Server 2005 Setup

Components to Install

Select the components to install or upgrade.

☑ SQL Server Database Services

□ Create a SQL Server failover cluster

□ Analysis Services

□ Create an Analysis Server failover cluster

□ Reporting Services

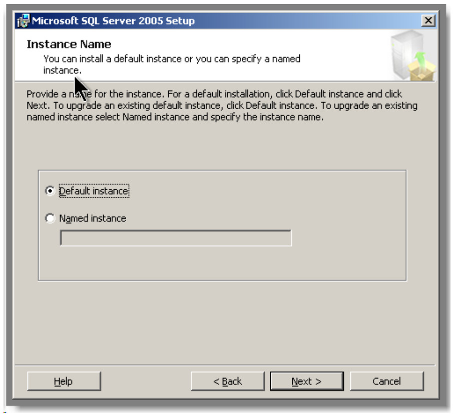
☑ Notification Services

☑ Integration Services

☑ Workstation components, Books Online and development tools

For more options, click Advanced.

5. Select the 'Default Instance' as the instance name, and click **[Next].**



Microsoft SQL Server 2005 Setup

Instance Name

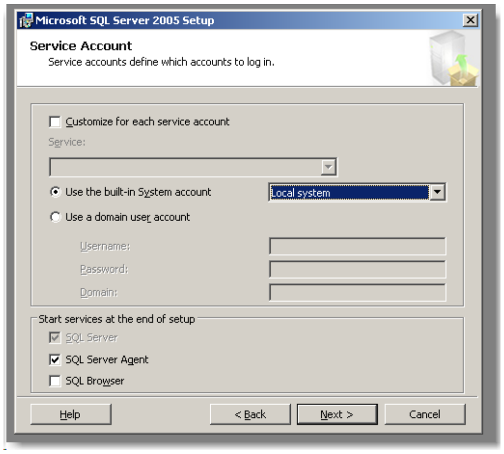
You can install a default instance or you can specify a named instance.

Provide a name for the instance. For a default installation, click Default instance and click Next. To upgrade an existing default instance, click Default instance. To upgrade an existing named instance select Named instance and specify the instance name.

● Default instance

○ Named instance

6. Select the option (shown below) to configure all of the SQL Services to run as the local system account and enable the SQL Server and SQL Server Agent services to be started after setup ends, and click **[Next].**



Microsoft SQL Server 2005 Setup

Service Account

Service accounts define which accounts to log in.

□ Customize for each service account

Service:

● Use the built-in System account: Local system

○ Use a domain user account

Username:

Password:

Domain:

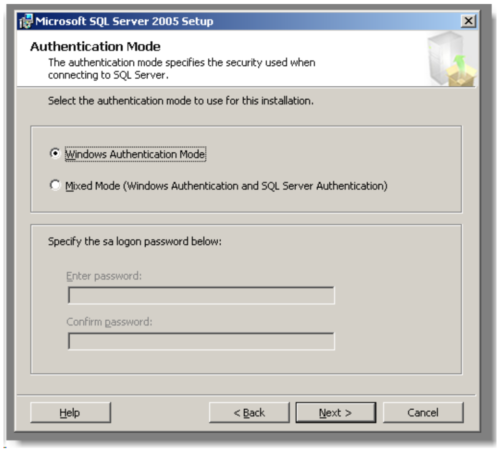
Start services at the end of setup

☑ SQL Server

☑ SQL Server Agent

□ SQL Browser

7. Choose ‘Windows Authentication Mode’ as the authentication mode to use for the installation, and click **[Next].**



Authentication Mode

The authentication mode specifies the security used when connecting to SQL Server.

Select the authentication mode to use for this installation.

● Windows Authentication Mode

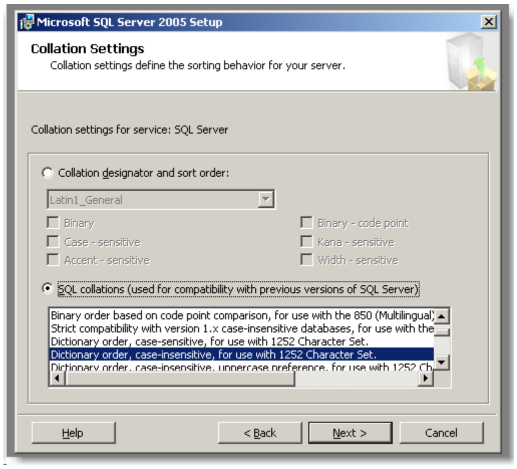
○ Mixed Mode (Windows Authentication and SQL Server Authentication)

Specify the sa logon password below:

Enter password:

Confirm password:

8. Choose the defaults for the Collation Settings, as shown below, and click **[Next].**



Collation Settings

Collation settings define the sorting behavior for your server.

Collation settings for service: SQL Server

○ Collation designator and sort order:

Latin1_General

□ Binary □ Binary - code point

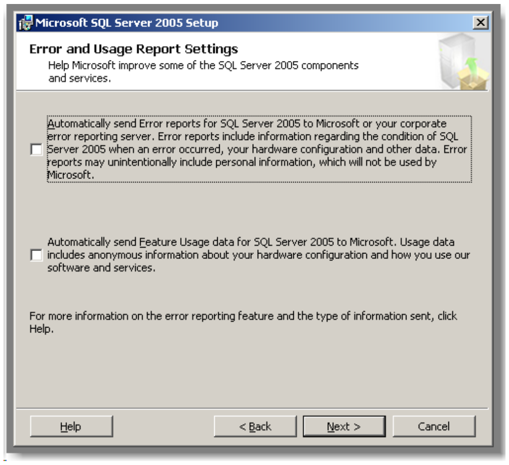
□ Case - sensitive □ Kana - sensitive

□ Accent - sensitive □ Width - sensitive

● SQL collations (used for compatibility with previous versions of SQL Server)

```
Binary order based on code point comparison, for use with the 850 (Multilingual)
Strict compatibility with version 1.x case-insensitive databases, for use with the
Dictionary order, case-sensitive, for use with 1252 Character Set.
Dictionary order, case-insensitive, for use with 1252 Character Set.
Dictionary order, case-insensitive, uppercase preference, for use with 1252 Ch
```

9. Verify the defaults on the ‘Error and Usage Report Settings’ dialog. Be sure to uncheck both checkboxes, and click **[Next].**



Error and Usage Report Settings

Help Microsoft improve some of the SQL Server 2005 components and services.

□ Automatically send Error reports for SQL Server 2005 to Microsoft or your corporate error reporting server. Error reports include information regarding the condition of SQL Server 2005 when an error occurred, your hardware configuration and other data. Error reports may unintentionally include personal information, which will not be used by Microsoft.

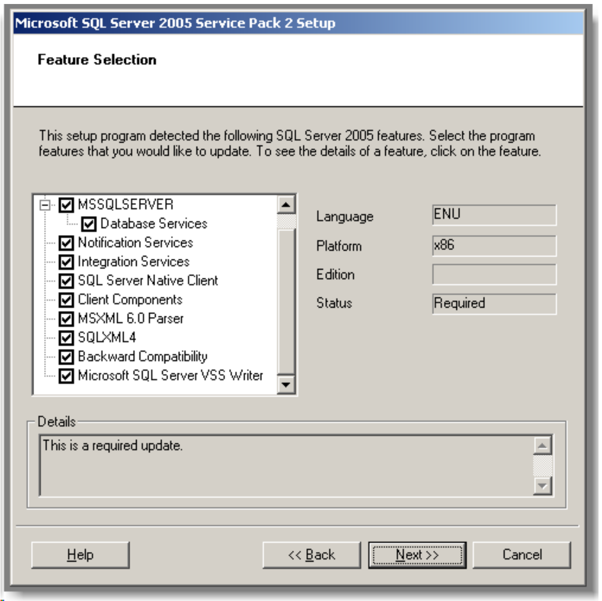
□ Automatically send Feature Usage data for SQL Server 2005 to Microsoft. Usage data includes anonymous information about your hardware configuration and how you use our software and services.

For more information on the error reporting feature and the type of information sent, click Help.

10. Click the [Install] button on the final 'Ready to Install' dialog and allow the installer to finish the setup of the SQL instance. Be prepared to wait for a bit, as the setup process takes several minutes.
11. Once all of the components are labeled as 'setup finished' the installation is complete; click on the [Next] button
12. Click the [Finish] button in the 'Completing Microsoft SQL Server Setup' dialog once you have reviewed the installation summary (if applicable).

Once the SQL Server setup has been completed, the latest service pack for SQL 2005 (SP2, at this writing) must be installed. The following procedure details the installation of this update.

1. Locate the SP2 binaries on the COK GALSync Resources CD (or download from www.microsoft.com) in the \SQL 2005 folder. Double-click on the 'SQLServer2005SP2-KB921896-x86-ENU.exe' file and let it being extraction.
2. Once the wizard starts, click [Next] to proceed past the welcome page
3. Select the appropriate radio button to accept the license agreement, and then click [Next].
4. Ensure that all of the components are selected for update, as shown below:



Microsoft SQL Server 2005 Service Pack 2 Setup

Feature Selection

This setup program detected the following SQL Server 2005 features. Select the program features that you would like to update. To see the details of a feature, click on the feature.

- ☑ MSSQLSERVER
  - ☑ Database Services
- ☑ Notification Services
- ☑ Integration Services
- ☑ SQL Server Native Client
- ☑ Client Components
- ☑ MSXML 6.0 Parser
- ☑ SQLXML4
- ☑ Backward Compatibility
- ☑ Microsoft SQL Server VSS Writer

Language: ENU

Platform: x86

Edition:

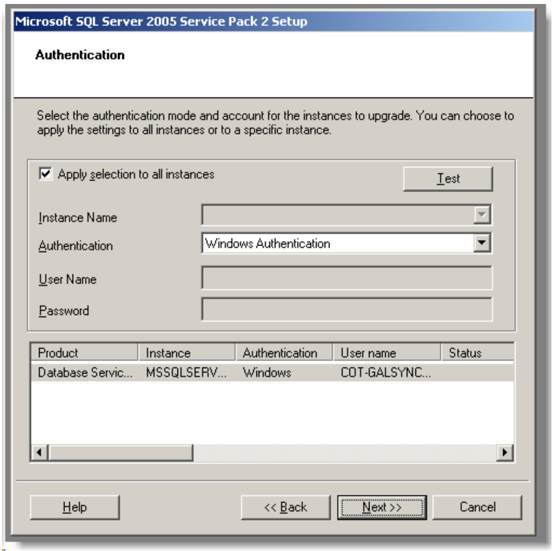
Status: Required

Details

This is a required update.

and then click [Next].

5. Ensure that the appropriate authentication method is selected, as shown below:


Microsoft SQL Server 2005 Service Pack 2 Setup

Authentication

Select the authentication mode and account for the instances to upgrade. You can choose to apply the settings to all instances or to a specific instance.

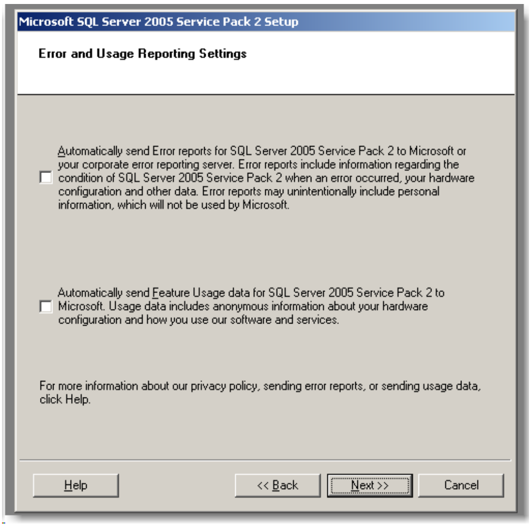
☑ Apply selection to all instances

Instance Name:
Authentication: Windows Authentication
User Name:
Password:

Product	Instance	Authentication	User name	Status
Database Servic...	MSSQLSERV...	Windows	COT-GALSYNC...	

and then click [Next].

6. Verify the defaults on the ‘Error and Usage Report Settings’ dialog. Be sure to uncheck both checkboxes, and click **[Next].**


Microsoft SQL Server 2005 Service Pack 2 Setup

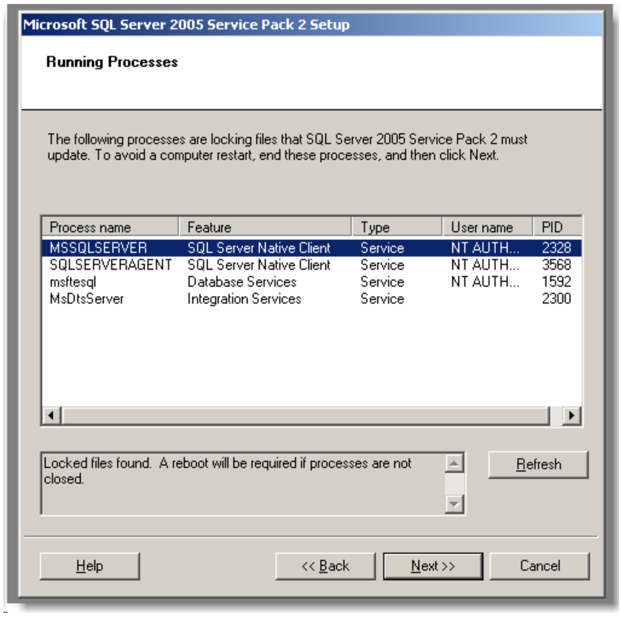
Error and Usage Reporting Settings

☐ Automatically send Error reports for SQL Server 2005 Service Pack 2 to Microsoft or your corporate error reporting server. Error reports include information regarding the condition of SQL Server 2005 Service Pack 2 when an error occurred, your hardware configuration and other data. Error reports may unintentionally include personal information, which will not be used by Microsoft.

☐ Automatically send Feature Usage data for SQL Server 2005 Service Pack 2 to Microsoft. Usage data includes anonymous information about your hardware configuration and how you use our software and services.

For more information about our privacy policy, sending error reports, or sending usage data, click Help.

7. The service pack installer will then search for locked files and owning processes and will list them in the dialog below:



Microsoft SQL Server 2005 Service Pack 2 Setup

Running Processes

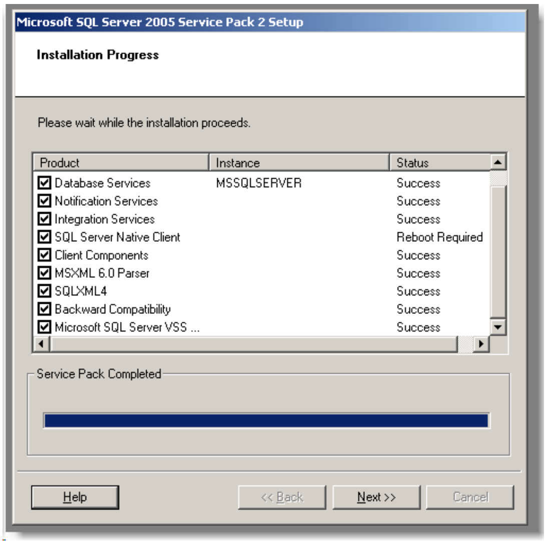
The following processes are locking files that SQL Server 2005 Service Pack 2 must update. To avoid a computer restart, end these processes, and then click Next.

Process name	Feature	Type	User name	PID
MSSQLSERVER	SQL Server Native Client	Service	NT AUTH...	2328
SQLSERVERAGENT	SQL Server Native Client	Service	NT AUTH...	3568
msftesql	Database Services	Service	NT AUTH...	1592
MsDtsServer	Integration Services	Service		2300

Locked files found. A reboot will be required if processes are not closed.

You have the option of either manually stopping all of the SQL-related services, clicking refresh and proceeding with the install, or you can alternatively click [Next] and allow the installer to go ahead and lay down the updated binaries, but a reboot will be necessary after the service pack finishes installing. Click [Next] when ready to continue.

8. Click on [Install] in the ‘Ready to Install’ dialog box to begin the setup process.
9. You will then see an ‘Installation Process’ dialog that will show how the application of the service pack is proceeding. When it is finished, the dialog should look like the following:



Microsoft SQL Server 2005 Service Pack 2 Setup

Installation Progress

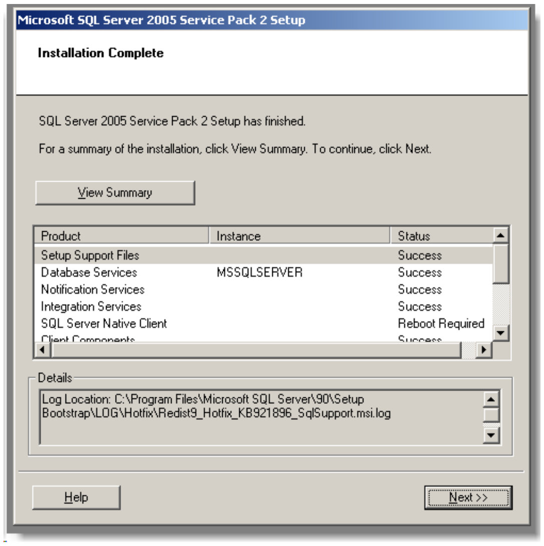
Please wait while the installation proceeds.

Product	Instance	Status
☑ Database Services	MSSQLSERVER	Success
☑ Notification Services		Success
☑ Integration Services		Success
☑ SQL Server Native Client		Reboot Required
☑ Client Components		Success
☑ MSXML 6.0 Parser		Success
☑ SQLXML4		Success
☑ Backward Compatibility		Success
☑ Microsoft SQL Server VSS ...		Success

Service Pack Completed

Click [Next] to continue.

10. Click [Next] to continue through the installation summary dialog



Microsoft SQL Server 2005 Service Pack 2 Setup

Installation Complete

SQL Server 2005 Service Pack 2 Setup has finished.

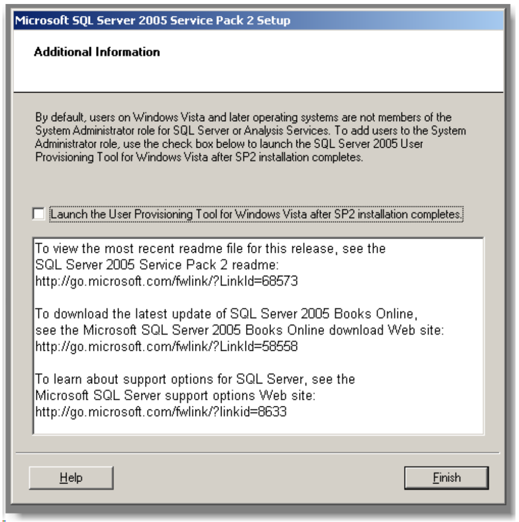
For a summary of the installation, click View Summary. To continue, click Next.

Product	Instance	Status
Setup Support Files		Success
Database Services	MSSQLSERVER	Success
Notification Services		Success
Integration Services		Success
SQL Server Native Client		Reboot Required
Client Components		Success

Details

Log Location: C:\Program Files\Microsoft SQL Server\90\Setup Bootstrap\LOG\Hotfix\Redist9_Hotfix_KB921896_SqlSupport.msi.log

11. Be sure to uncheck the checkbox that would otherwise start the user provisioning tool for Vista. This step is not necessary for the GALSync implementation:



Microsoft SQL Server 2005 Service Pack 2 Setup

Additional Information

By default, users on Windows Vista and later operating systems are not members of the System Administrator role for SQL Server or Analysis Services. To add users to the System Administrator role, use the check box below to launch the SQL Server 2005 User Provisioning Tool for Windows Vista after SP2 installation completes.

□ Launch the User Provisioning Tool for Windows Vista after SP2 installation completes.

To view the most recent readme file for this release, see the SQL Server 2005 Service Pack 2 readme:
http://go.microsoft.com/fwlink/?LinkId=68573

To download the latest update of SQL Server 2005 Books Online, see the Microsoft SQL Server 2005 Books Online download Web site:
http://go.microsoft.com/fwlink/?LinkId=58558

To learn about support options for SQL Server, see the Microsoft SQL Server support options Web site:
http://go.microsoft.com/fwlink/?linkid=8633

Click [Finish] when complete.

12. Perform a restart of the server so that the files replaced during the service pack installation can be initialized upon the next boot-up.

Identity Integration Feature Pack

This section details the installation and configuration of the IIFP. Make sure you have completed the following tasks prior to performing the steps outlined in this section.

IIFP Installation Prerequisites

1. Have completed and submitted the "GALSync Letter of Acknowledgement" (see Appendix A) to COT and have received subsequent approval back to the agency contactee with approval and details on the agency-specific service account that is to be used to connect to the GALSync forest.
2. Installed and configured the Agencie's GALSync server and base OS per this document
3. Installed SQL 2005 and updated it with the latest service pack (per this document)
4. Create a domain-level service account, named 'COKGALSync' to be the service account that the IIFP runs under.
    a. **Be sure this account has a complex password!**
    b. **This account should not be a member of any administrative groups!**
    c. **Locate this account within the domain as you see fit.**
    d. **The account should have its password set to never expire and does not require change at next logon**
    e. **Do not limit the logon hours or workstations to which this account can log on from.**
    f. **This account should NOT have an Exchange 2003 mailbox.**
5. Configure this account to be a local administrator on the GALSync server
6. Configure this account to have the 'Replicate Directory Change' permission on each domain where the IIFP will have to read/write updates to/from. In practice, this is likely each and every domain that has Exchange recipients in your forest and the domain (assumed to be the forest root) where the contacts will be stored.
7. Created a 'State Contacts' top-level OU in the root domain and have assigned the domain-level GALSync service account to have 'Full Control' permissions and that they apply to 'this object and all child objects' as well.

    More information on this permission (and its requirement) can be found here: http://support.microsoft.com/?id=303972

    A copy of this QArticle is also included in **Appendix C - How to grant the "Replicating Directory Changes" permission for the Microsoft Metadirectory Services ADMA service account**

IIFP Installation and Initial Configuration

Note

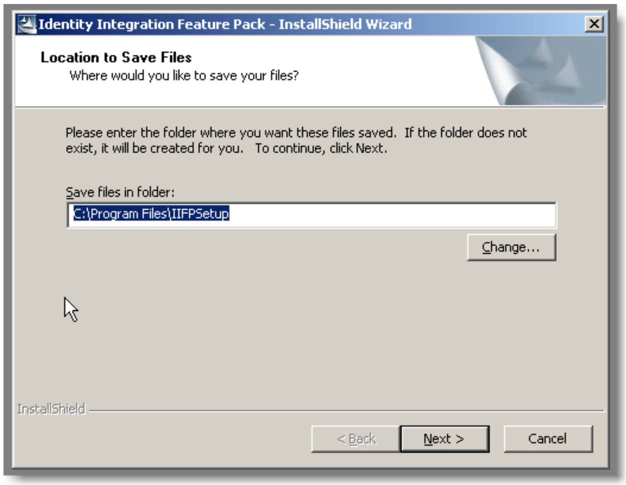
Perform these steps while logged on as the IIFP Service Account.

Once the aforementioned prerequisites have been met, proceed with the following steps to install and configure the IIFP on the agency GALSync server.

Browse to the 'IIFP' folder on the 'COK GALSync Resources' CD.

From there, execute the 'Identity Integration Feature Pack with SP2.exe' file to begin the installation of the IIFP.

8. Select the default extraction folder



Identity Integration Feature Pack - InstallShield Wizard

Location to Save Files

Where would you like to save your files?

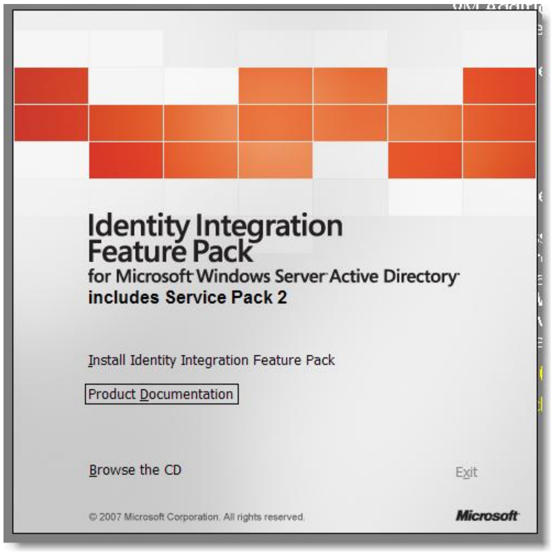
Please enter the folder where you want these files saved. If the folder does not exist, it will be created for you. To continue, click Next.

Save files in folder:

C:\Program Files\IIFPSetup

and click [Next].

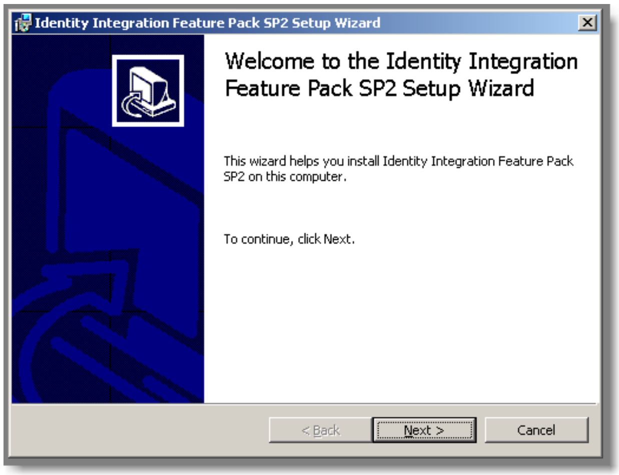
9. Click on the 'Install the Microsoft Identity Integration Feature Pack' link



Identity Integration Feature Pack
for Microsoft Windows Server Active Directory
includes Service Pack 2

Install Identity Integration Feature Pack
Product Documentation
Browse the CD
Exit
© 2007 Microsoft Corporation. All rights reserved.
Microsoft

10. Allow the installer to load and begin extracting the installation wizard. Once the main installer UI loads, then click the [Next] button to proceed



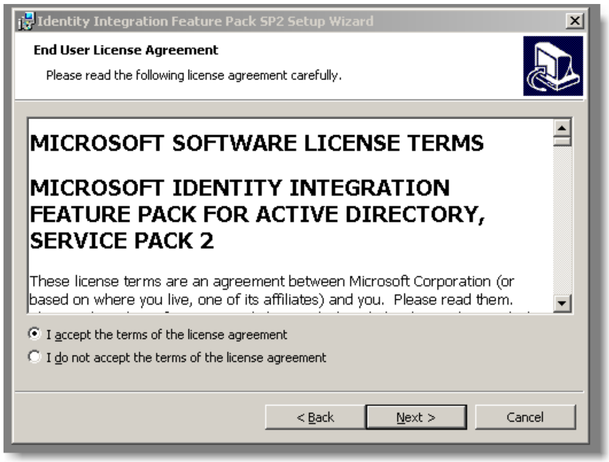
Identity Integration Feature Pack SP2 Setup Wizard

Welcome to the Identity Integration Feature Pack SP2 Setup Wizard

This wizard helps you install Identity Integration Feature Pack SP2 on this computer.

To continue, click Next.

11. Accept the end-user license agreement, and click [Next] to continue



Identity Integration Feature Pack SP2 Setup Wizard

End User License Agreement

Please read the following license agreement carefully.

MICROSOFT SOFTWARE LICENSE TERMS

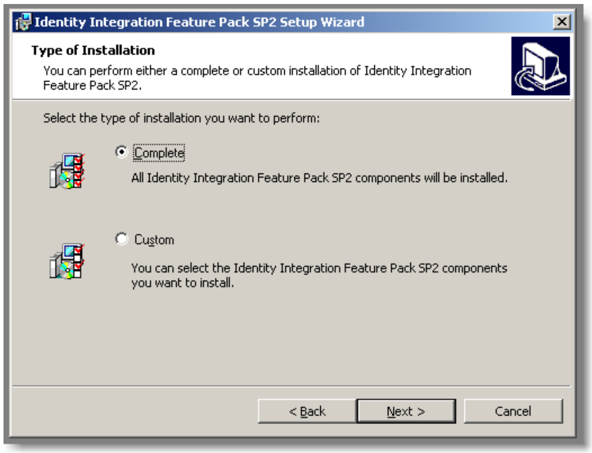
MICROSOFT IDENTITY INTEGRATION FEATURE PACK FOR ACTIVE DIRECTORY, SERVICE PACK 2

These license terms are an agreement between Microsoft Corporation (or based on where you live, one of its affiliates) and you. Please read them.

● I accept the terms of the license agreement

○ I do not accept the terms of the license agreement

12. Verify that ‘Complete’ is chosen as the installation option, and click [Next] to continue



Identity Integration Feature Pack SP2 Setup Wizard

Type of Installation

You can perform either a complete or custom installation of Identity Integration Feature Pack SP2.

Select the type of installation you want to perform:

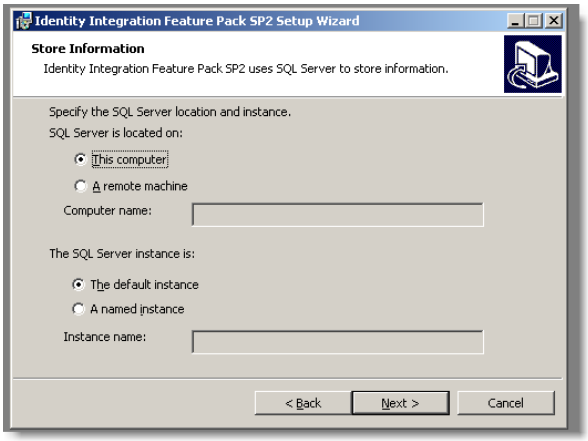
● Complete

All Identity Integration Feature Pack SP2 components will be installed.

○ Custom

You can select the Identity Integration Feature Pack SP2 components you want to install.

13. Verify the SQL instance information and click [Next] when ready to proceed



Identity Integration Feature Pack SP2 Setup Wizard

Store Information

Identity Integration Feature Pack SP2 uses SQL Server to store information.

Specify the SQL Server location and instance.

SQL Server is located on:

● This computer

○ A remote machine

Computer name:

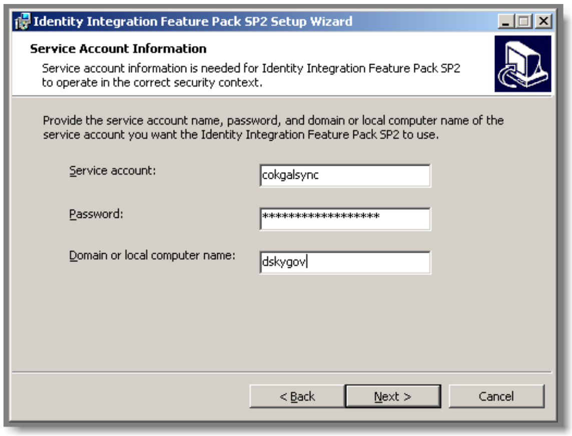
The SQL Server instance is:

● The default instance

○ A named instance

Instance name:

14. Enter in the IIFP service account username, password and domain membership (be sure to use the NETBIOS name here) in the following dialog, then click [Next]



Identity Integration Feature Pack SP2 Setup Wizard

Service Account Information

Service account information is needed for Identity Integration Feature Pack SP2 to operate in the correct security context.

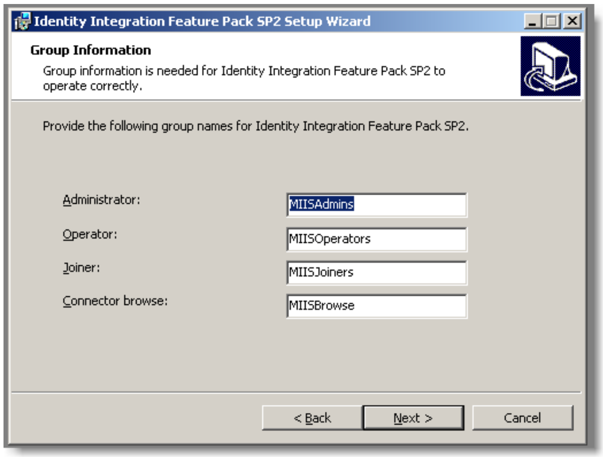
Provide the service account name, password, and domain or local computer name of the service account you want the Identity Integration Feature Pack SP2 to use.

Service account: cokgalsync

Password: ******************

Domain or local computer name: dskygov

15. Verify (and accept) the default group names and click [Next].



Group Information

Group information is needed for Identity Integration Feature Pack SP2 to operate correctly.

Provide the following group names for Identity Integration Feature Pack SP2.

Administrator: MIISAdmins

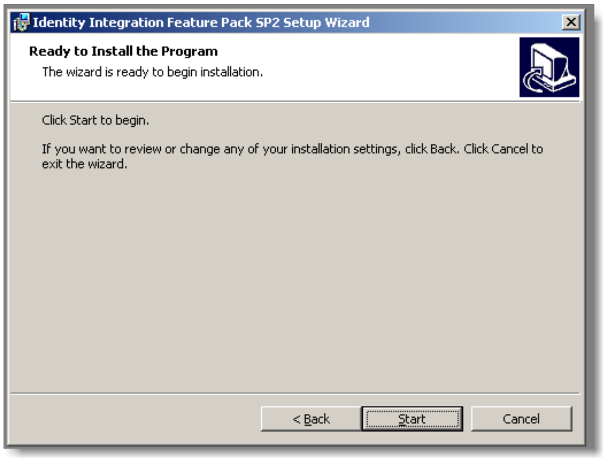
Operator: MIISOperators

Joiner: MIISJoiners

Connector browse: MIISBrowse

These are local security groups that will be created on the IIFP server so that you can delegate administrative permissions to others in your environment, if you wish.

16. Click [Start] to begin the installation



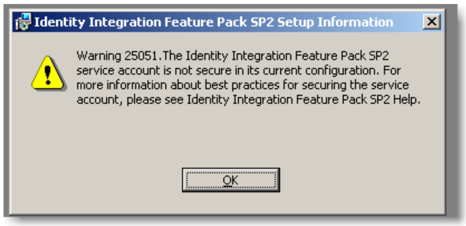
Ready to Install the Program

The wizard is ready to begin installation.

Click Start to begin.

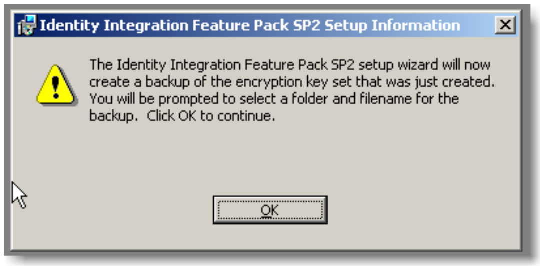
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.

17. Click [OK] to acknowledge the 'security' dialog. We will correct this once the installation is finished.



Warning 25051.The Identity Integration Feature Pack SP2 service account is not secure in its current configuration. For more information about best practices for securing the service account, please see Identity Integration Feature Pack SP2 Help.

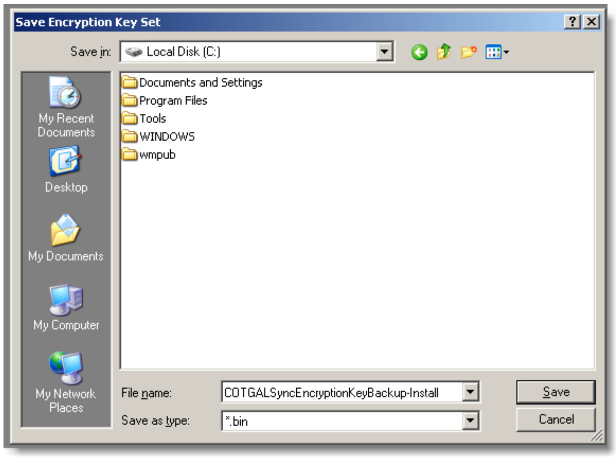
18. Click [OK] to acknowledge the security keys dialog. We will locate the backup in the next step



Identity Integration Feature Pack SP2 Setup Information

The Identity Integration Feature Pack SP2 setup wizard will now create a backup of the encryption key set that was just created. You will be prompted to select a folder and filename for the backup. Click OK to continue.

19. Locate the backup .BIN file somewhere easy to find (the root of the system drive is used in this example). Name the key accordingly (COTGALSyncEncryptionKeyBackup-Install.bin used in this example), then allow the wizard to continue by clicking [Save]



Save Encryption Key Set

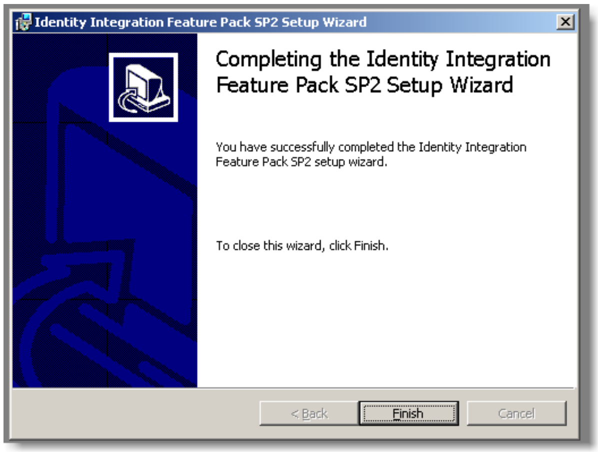
Save in: Local Disk (C:)

Documents and Settings
Program Files
Tools
WINDOWS
wmpub

File name: COTGALSyncEncryptionKeyBackup-Install

Save as type: *.bin

20. Click [Finish] once the wizard completes.



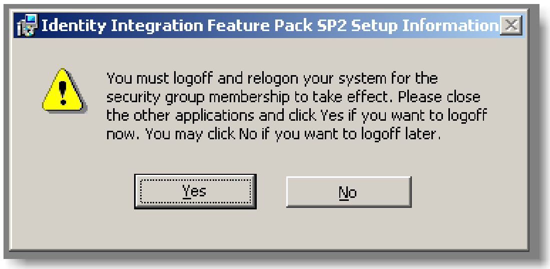
Identity Integration Feature Pack SP2 Setup Wizard

Completing the Identity Integration Feature Pack SP2 Setup Wizard

You have successfully completed the Identity Integration Feature Pack SP2 setup wizard.

To close this wizard, click Finish.

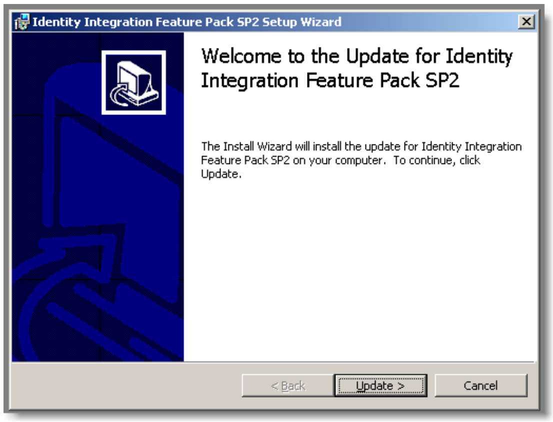
21. Click [Yes] to log off, then log back on as the IIFP Service account.



You must logoff and relogon your system for the security group membership to take effect. Please close the other applications and click Yes if you want to logoff now. You may click No if you want to logoff later.

22. After logging back on, open up explorer and navigate to the 'COK GALSync Resources CD' (or mount the ISO Image) and browse to the 'IIFP' folder. Execute the 'IIFP2003Update-KB938015.msp' file to begin the installation of the post-SP2 hotfix that is required for this implementation.

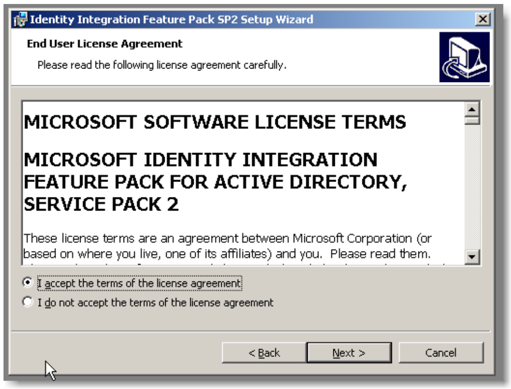
23. Click [Update] on the hotfix welcome screen and proceed through the wizard to install the hotfix.



Welcome to the Update for Identity Integration Feature Pack SP2

The Install Wizard will install the update for Identity Integration Feature Pack SP2 on your computer. To continue, click Update.

24. Accept the terms of the licensing agreement, and click [Next]



End User License Agreement

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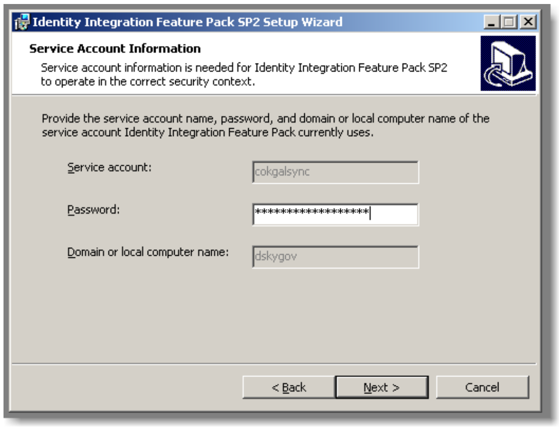
25. Enter in the IIFP Service account password where indicated, and click [Next]



Identity Integration Feature Pack SP2 Setup Wizard

Service Account Information

Service account information is needed for Identity Integration Feature Pack SP2 to operate in the correct security context.

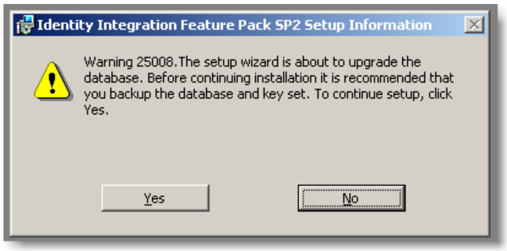
Provide the service account name, password, and domain or local computer name of the service account Identity Integration Feature Pack currently uses.

Service account: cokgalsync

Password: ******************

Domain or local computer name: dskygov

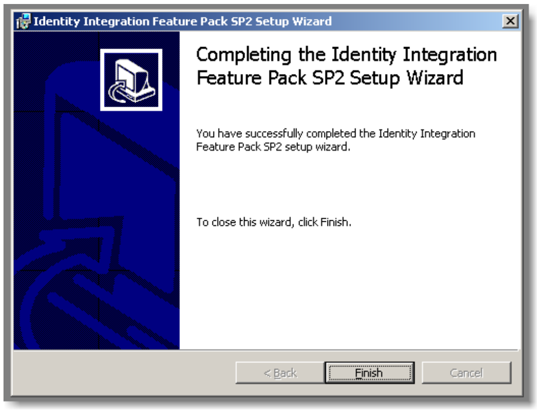
26. Click [Yes] to proceed with the update. Neither the database backup or key backups are necessary at this point, due to there not being any data (of value) in the database. We will back up the key set later in this section of the document.



Identity Integration Feature Pack SP2 Setup Information

Warning 25008.The setup wizard is about to upgrade the database. Before continuing installation it is recommended that you backup the database and key set. To continue setup, click Yes.

27. Click [Finish] when the wizard completes



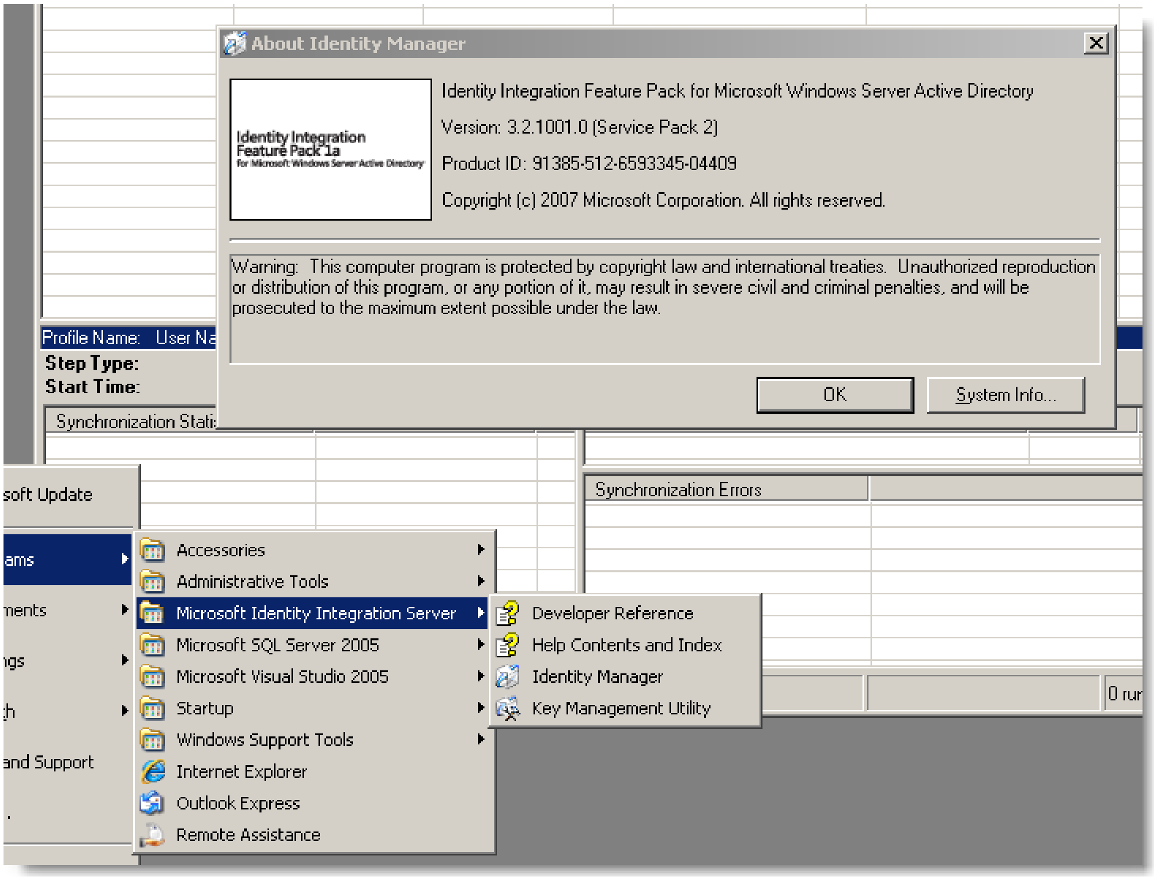
Identity Integration Feature Pack SP2 Setup Wizard

Completing the Identity Integration Feature Pack SP2 Setup Wizard

You have successfully completed the Identity Integration Feature Pack SP2 setup wizard.

To close this wizard, click Finish.

28. Start the Identity Manager application (as shown below) then click on Help -> About and verify that the version number is reported as '3.2.1001.0'



Identity Integration Feature Pack for Microsoft Windows Server Active Directory

Version: 3.2.1001.0 (Service Pack 2)

Product ID: 91385-512-6593345-04409

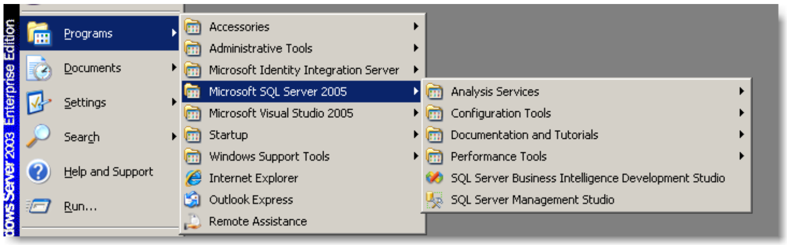
Copyright (c) 2007 Microsoft Corporation. All rights reserved.

Warning: This computer program is protected by copyright law and international treaties. Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under the law.

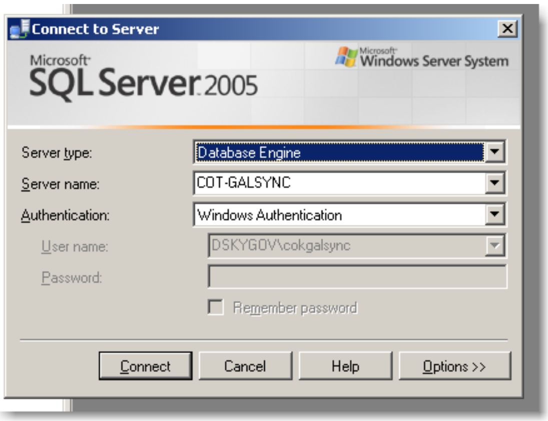
This version number indicates that the post-SP2 hotfix installed correctly. The version number for SP2 (as released) is 3.2.559.0.

29. In the next steps, we will perform a backup of the SQL Databases and the IIFP encryption keys. These backups will then need to be stored off-server in a protected location in the event that the server ever needs to be reinstalled or returned to its 'before GALSync/pristine' state.

30. Open the SQL Server Management Studio, as shown below:


Windows Server 2003 Enterprise Edition
Programs
Documents
Settings
Search
Help and Support
Run...
Accessories
Administrative Tools
Microsoft Identity Integration Server
Microsoft SQL Server 2005
Microsoft Visual Studio 2005
Startup
Windows Support Tools
Internet Explorer
Outlook Express
Remote Assistance
Analysis Services
Configuration Tools
Documentation and Tutorials
Performance Tools
SQL Server Business Intelligence Development Studio
SQL Server Management Studio

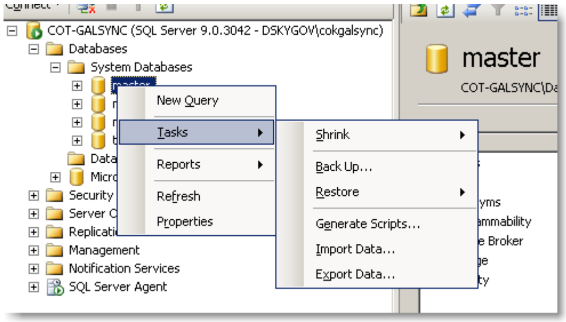
31. Click [Connect] to connect to the default instance on the SQL Server:



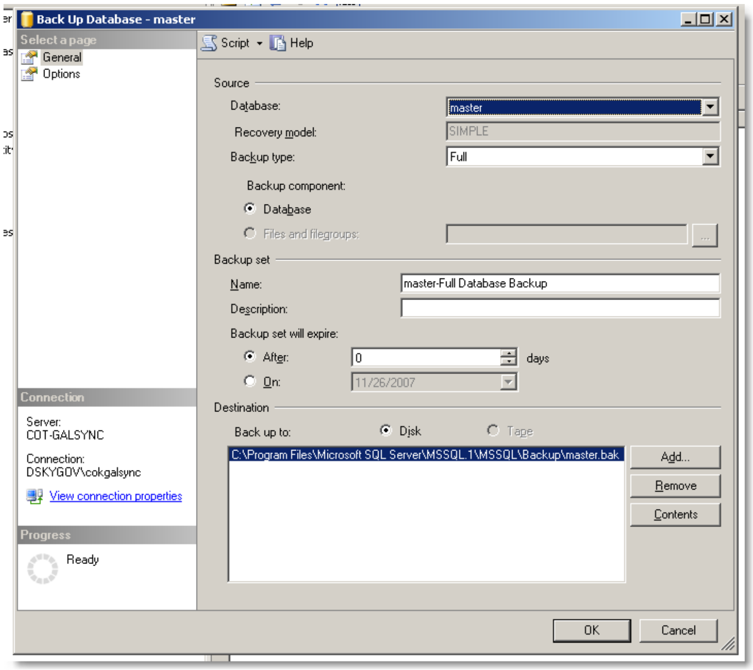
Server type: Database Engine
Server name: COT-GALSYNC
Authentication: Windows Authentication
User name: DSKYGOV\cokgalsync
Password:
□ Remember password

32. We will begin by making a backup of each of the databases on the server. Once the SQL Management Studio loads, drill down through the server and expand the databases node, then the 'System Databases' node, as shown below. Repeat the following procedure for each of the system databases, and then one final time for the 'MicrosoftIdentityIntegrationServer' database. The MASTER database is shown here for illustrative purposes, but all databases will back up in the same manner.

   a. Right click on the database, select 'Tasks -> Backup'



   b. Make note of the location of the backup destination (c:\program files\microsoft SQL Server\MSSQL.1\MSSQL\Backup) and the name of the backup file (this will vary for each database – just accept the default) and then click [OK] to begin the backup process.


Back Up Database - master

Source

Database: master

Recovery model: SIMPLE

Backup type: Full

Backup component:

● Database

○ Files and filegroups:

Backup set

Name: master-Full Database Backup

Description:

Backup set will expire:

● After: 0 days

○ On: 11/26/2007

Destination

Back up to: ● Disk ○ Tape

C:\Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\Backup\master.bak

Connection

Server: COT-GALSYNC

Connection: DSKYGOV\cokgalsync

Progress

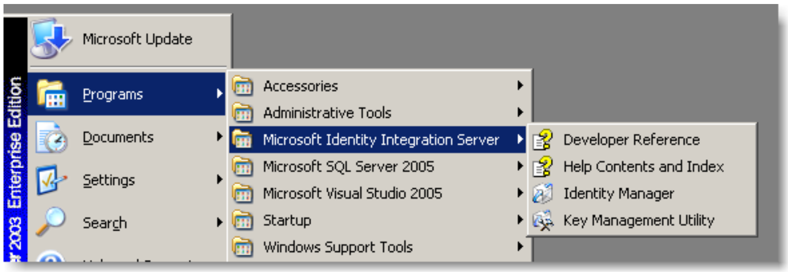
Ready

c. Click [OK] to acknowledge the successful backup in the dialog that pops up.

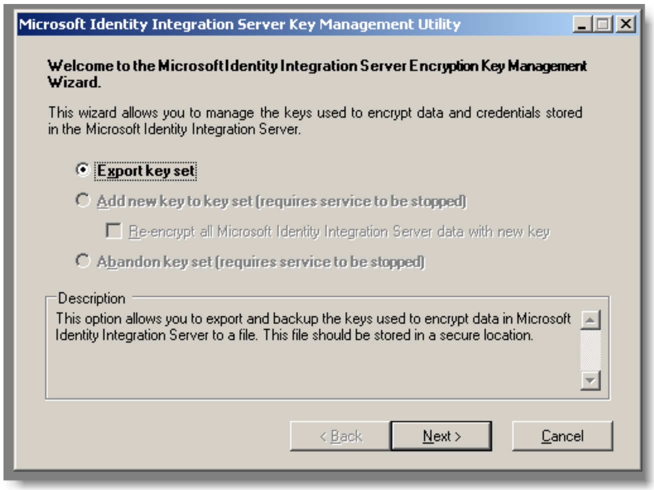
d. Repeat for the next database until finished (skip tempdb).

33. Open the folder that contains all of the backup files and copy them to a safe location that will be considered permanent storage (CD-ROM, protected file server, etc.)

34. Next, open the IIFP Key Management Utility:



35. Once the key management utility starts, verify that 'Export Key set' is chosen and click [Next]



Microsoft Identity Integration Server Key Management Utility

Welcome to the Microsoft Identity Integration Server Encryption Key Management Wizard.

This wizard allows you to manage the keys used to encrypt data and credentials stored in the Microsoft Identity Integration Server.

● Export key set

○ Add new key to key set (requires service to be stopped)

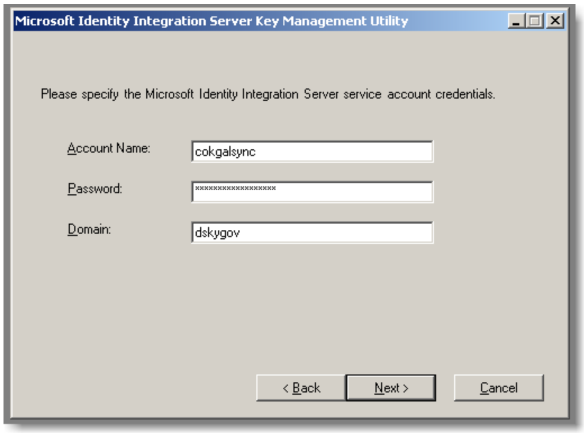
□ Re-encrypt all Microsoft Identity Integration Server data with new key

○ Abandon key set (requires service to be stopped)

Description

This option allows you to export and backup the keys used to encrypt data in Microsoft Identity Integration Server to a file. This file should be stored in a secure location.

36. Enter in the credentials requested and the domain name, and click [Next]



Microsoft Identity Integration Server Key Management Utility

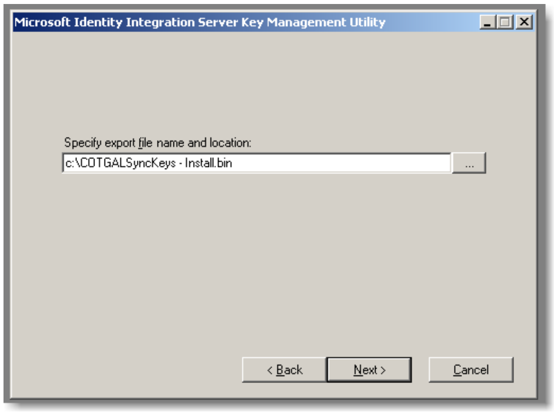
Please specify the Microsoft Identity Integration Server service account credentials.

Account Name: cokgalsync

Password: ****************

Domain: dskygov

37. Determine an appropriate location and name for the exported key file (use something descriptive so you can identify it later, if it is ever needed). And then click [Next]

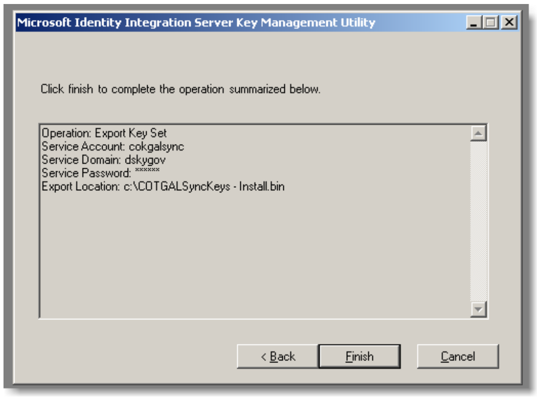


Microsoft Identity Integration Server Key Management Utility

Specify export file name and location:

c:\COTGALSyncKeys - Install.bin

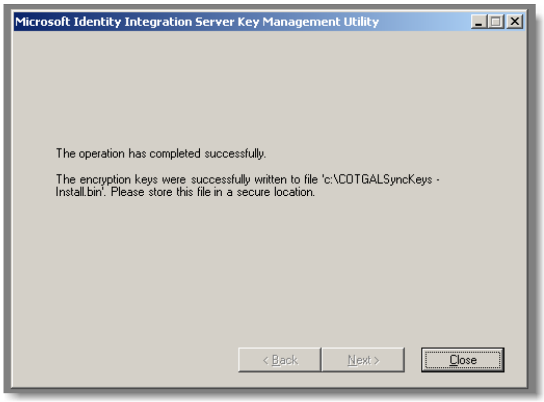
38. Click [Finish] to acknowledge the actions


Microsoft Identity Integration Server Key Management Utility
< Back
Finish
Cancel

Click finish to complete the operation summarized below.

Operation: Export Key Set
Service Account: cokgalsync
Service Domain: dskygov
Service Password: ******
Export Location: c:\COTGALSyncKeys - Install.bin

39. Click [Close] to exit the wizard.


Microsoft Identity Integration Server Key Management Utility
< Back
Next >
Close

The operation has completed successfully.

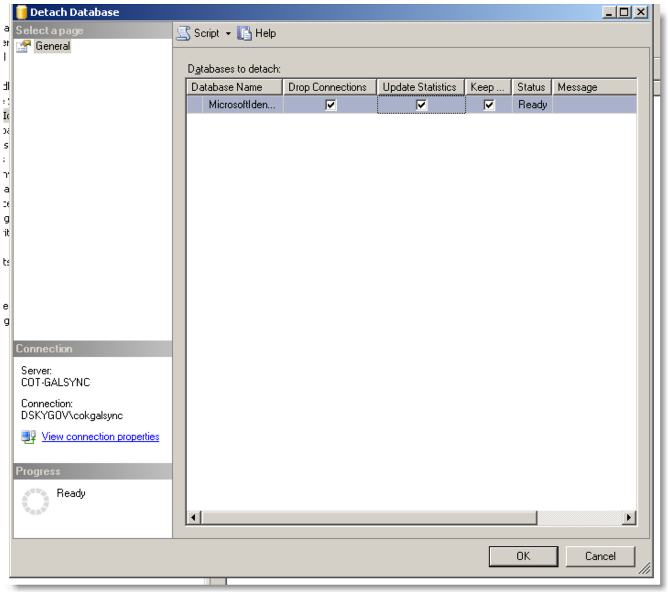
The encryption keys were successfully written to file 'c:\COTGALSyncKeys - Install.bin'. Please store this file in a secure location.

40. Open the folder that contains the backup key file and copy it to a safe location that will be considered permanent storage (CD-ROM, protected file server, etc.)

41. Now, open Computer Management and select the 'Services' node and then highlight the 'Microsoft Identity Integration Server' service, right click it and select 'Stop' from the context menu.

42. Once the service stops, re-open (or switch back to) the SQL Management Studio and then select the 'MicrosoftIdentityIntegrationServer' database, right-click on it and select 'Tasks -> Detach' from the context menu.

43. Be sure to select the ‘Drop Connections’ and ‘Update Statistics’ checkboxes, then click [OK]



Databases to detach:

Database Name	Drop Connections	Update Statistics	Keep ...	Status	Message
MicrosoftIden...	☑	☑	☑	Ready	

Connection

Server:
COT-GALSYNC

Connection:
DSKYGOV\cokgalsync

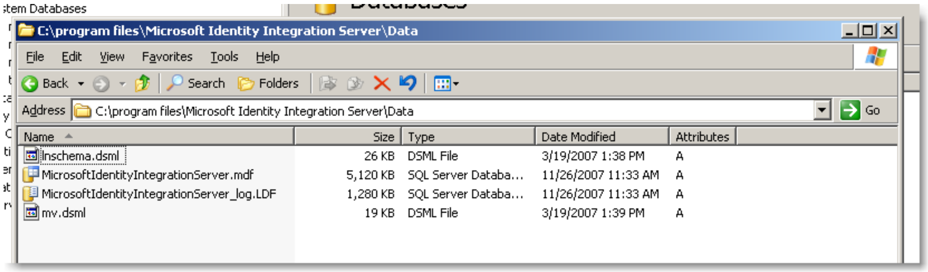
View connection properties

Progress

Ready

Click [OK] to acknowledge the dialog that pops up warning that the database is no longer accessible.

44. Using explorer, open ‘c:\program files\Microsoft Identity Integration Server\data’ folder and note that the IIFP database (.MDF) and log file (.LDF)



Address C:\program files\Microsoft Identity Integration Server\Data

Name	Size	Type	Date Modified	Attributes
lnschema.dsml	26 KB	DSML File	3/19/2007 1:38 PM	A
MicrosoftIdentityIntegrationServer.mdf	5,120 KB	SQL Server Databa...	11/26/2007 11:33 AM	A
MicrosoftIdentityIntegrationServer_log.LDF	1,280 KB	SQL Server Databa...	11/26/2007 11:33 AM	A
mv.dsml	19 KB	DSML File	3/19/2007 1:39 PM	A

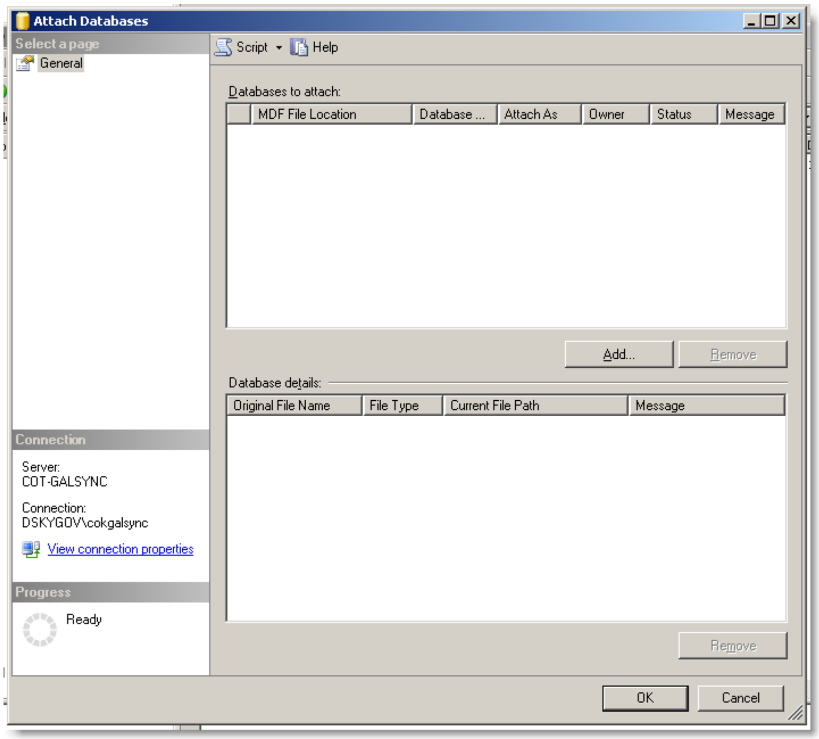
are in this folder.

45. Create the same folder structure on the D: (logs) and the E: (database) volumes.

46. Copy (not move) the LDF to the ‘**d:\Program Files\Microsoft Identity Integration Server\data’** folder and copy (not move) the MDF to the **‘e:\Program Files\Microsoft Identity Integration Server\data’** folder.

47. Switch back to the SQL Management Studio and select the 'Databases' node, right click and select 'Attach'.

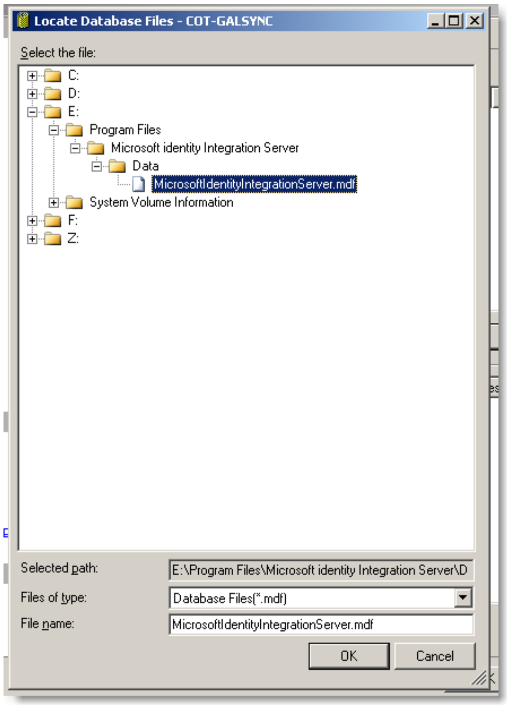
48. When the 'Attach Database' dialog pops up, click the [Add] button



Server:
COT-GALSYNC

Connection:
DSKYGOV\cokgalsync

49. Select the 'MicrosoftIdentityIntegrationServer' database file from the *NEW* location (E:) and then click [OK].

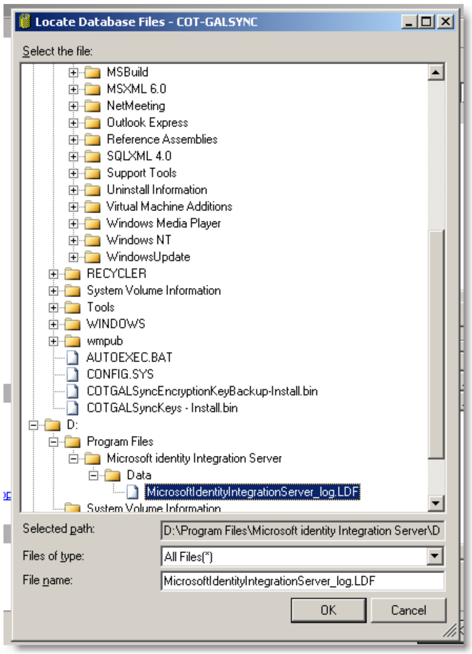

Locate Database Files - COT-GALSYNC
Select the file:
C:
D:
E:
Program Files
Microsoft identity Integration Server
Data
MicrosoftIdentityIntegrationServer.mdf
System Volume Information
F:
Z:
OK
Cancel

Selected path: E:\Program Files\Microsoft identity Integration Server\D

Files of type: Database Files(*.mdf)

File name: MicrosoftIdentityIntegrationServer.mdf

50. Notice that once the MDF file loads, the current file path for the logs is no longer correct. Click the small 'ellipses' button next to the log file path (incorrectly showing as C:) and select the appropriate log file and click [OK]


Locate Database Files - COT-GALSYNC
Select the file:
MSBuild
MSXML 6.0
NetMeeting
Outlook Express
Reference Assemblies
SQLXML 4.0
Support Tools
Uninstall Information
Virtual Machine Additions
Windows Media Player
Windows NT
WindowsUpdate
RECYCLER
System Volume Information
Tools
WINDOWS
wmpub
AUTOEXEC.BAT
CONFIG.SYS
COTGALSyncEncryptionKeyBackup-Install.bin
COTGALSyncKeys - Install.bin
D:
Program Files
Microsoft identity Integration Server
Data
MicrosoftIdentityIntegrationServer_log.LDF
System Volume Information
OK
Cancel

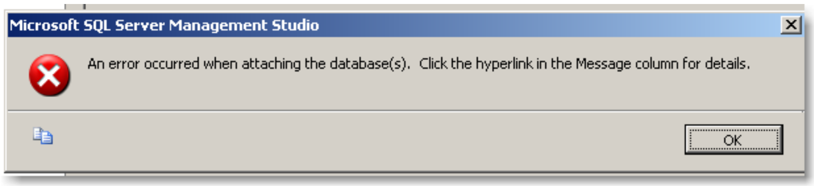
Selected path: D:\Program Files\Microsoft identity Integration Server\D

Files of type: All Files(*)

File name: MicrosoftIdentityIntegrationServer_log.LDF

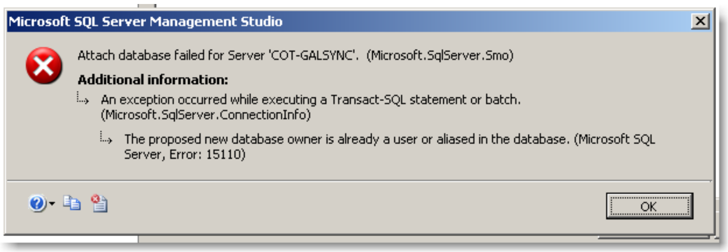
51. Once both of the paths show as correct in the 'Attach Database' dialog box, click [OK]

52. An 'error' dialog will likely pop up; click [OK]



An error occurred when attaching the database(s). Click the hyperlink in the Message column for details.

53. If you go back and click the hyperlink in the message column, you will be presented with another dialog that explains why the error occurred:



Attach database failed for Server 'COT-GALSYNC'. (Microsoft.SqlServer.Smo)

Additional information:

An exception occurred while executing a Transact-SQL statement or batch. (Microsoft.SqlServer.ConnectionInfo)

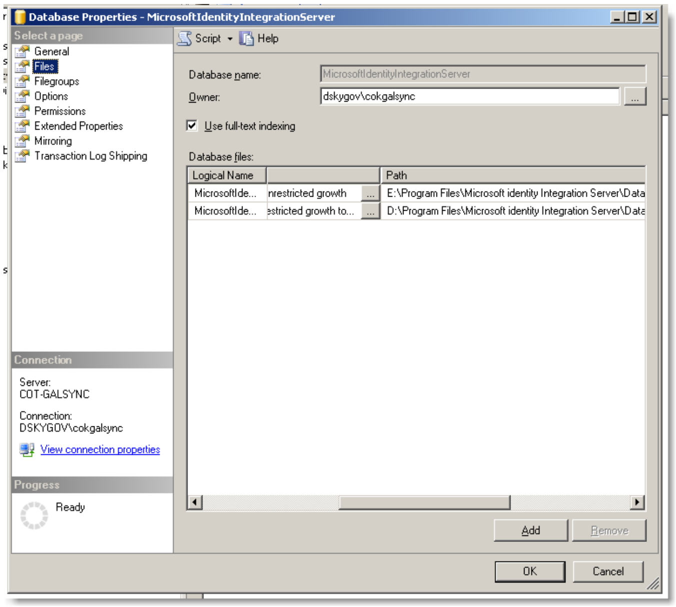
The proposed new database owner is already a user or aliased in the database. (Microsoft SQL Server, Error: 15110)

This is benign (and expected) so click [OK]. The database did attach correctly.

54. Click [Cancel] to dismiss the ‘Attach Databases’ dialog

55. Select the ‘Databases’ node and press [F5] to refresh the listing. You should see the ‘MicrosoftIdentityIntegrationServer’ database appear in the listing.

56. Open the properties for the database, then select the ‘Files’ page, and scroll to the right to verify that the database file and logs are being referenced in the proper location.



Database Properties - MicrosoftIdentityIntegrationServer

Database name: MicrosoftIdentityIntegrationServer

Owner: dskygov\cokgalsync

☑ Use full-text indexing

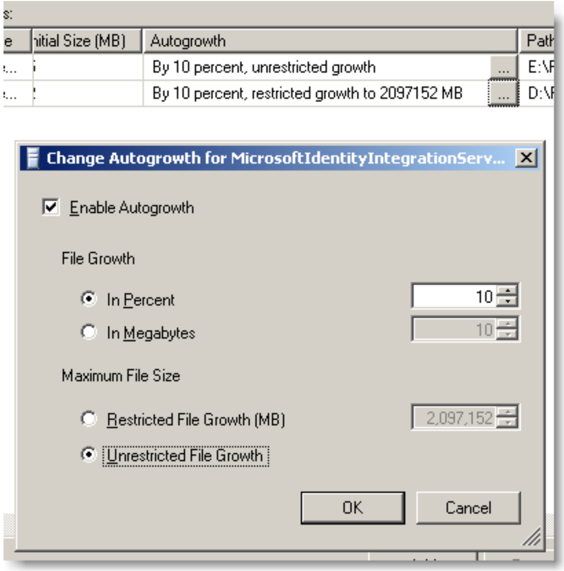
Database files:

Logical Name		Path
MicrosoftIde...	nrestricted growth	E:\Program Files\Microsoft identity Integration Server\Data
MicrosoftIde...	estricted growth to...	D:\Program Files\Microsoft identity Integration Server\Data

Server: COT-GALSYNC

Connection: DSKYGOV\cokgalsync

57. Scroll the window back to the point where the ‘Autogrowth’ column is visible. Notice that the transaction log is configured with a 2GB size limit. Click the ‘ellipses’ button to bring up the autogrowth dialog and change the ‘Maximum File Size’ to be ‘Unrestricted File Growth’ and click [OK]



e	nitial Size (MB)	Autogrowth	Path
:...	i	By 10 percent, unrestricted growth	E:\F
:...	:	By 10 percent, restricted growth to 2097152 MB	D:\F

Change Autogrowth for MicrosoftIdentityIntegrationServ...

☑ Enable Autogrowth

File Growth

● In Percent 10

○ In Megabytes 10

Maximum File Size

○ Restricted File Growth (MB) 2,097,152

● Unrestricted File Growth

58. Click [OK] once more to dismiss the database properties dialog.

59. Switch back to the 'Computer Management' console and start the 'Microsoft Identity Integration Server' service. Once it starts, stop it again.

60. Switch back to explorer and create the following directory structure on drive F:

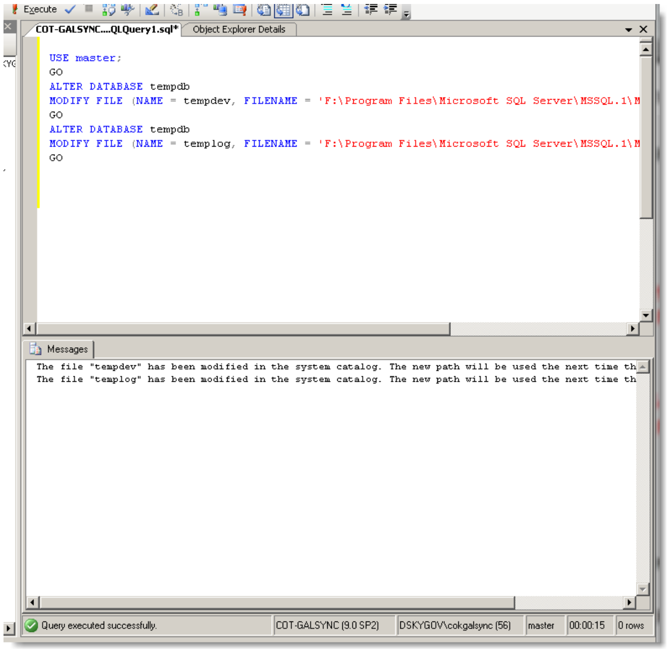
61. \Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\Data

62. Switch back to the SQL Management Studio and click the 'New Query' button

63. Copy and paste the following into the query pane:

```
USE master;
GO
ALTER DATABASE tempdb
MODIFY FILE (NAME = tempdev, FILENAME = 'F:\Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\data\tempdb.mdf');
GO
ALTER DATABASE tempdb
MODIFY FILE (NAME = templog, FILENAME = ' F:\Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\data\templog.ldf');
GO
```

64. Click Execute. Once the query executes, the screen should indicate the



```
USE master;
GO
ALTER DATABASE tempdb
MODIFY FILE (NAME = tempdev, FILENAME = 'F:\Program Files\Microsoft SQL Server\MSSQL.1\M
GO
ALTER DATABASE tempdb
MODIFY FILE (NAME = templog, FILENAME = 'F:\Program Files\Microsoft SQL Server\MSSQL.1\M
GO
```

```
The file "tempdev" has been modified in the system catalog. The new path will be used the next time th
The file "templog" has been modified in the system catalog. The new path will be used the next time th
```

Query executed successfully. | COT-GALSYNC (9.0 SP2) | DSKYGOV\cokgalsync (56) | master | 00:00:15 | 0 rows following:

65. Switch back to the 'Computer Management' console and restart the 'SQL Server (MSSQLSERVER)' service.

66. Restart the 'Microsoft Identity Integration Service'

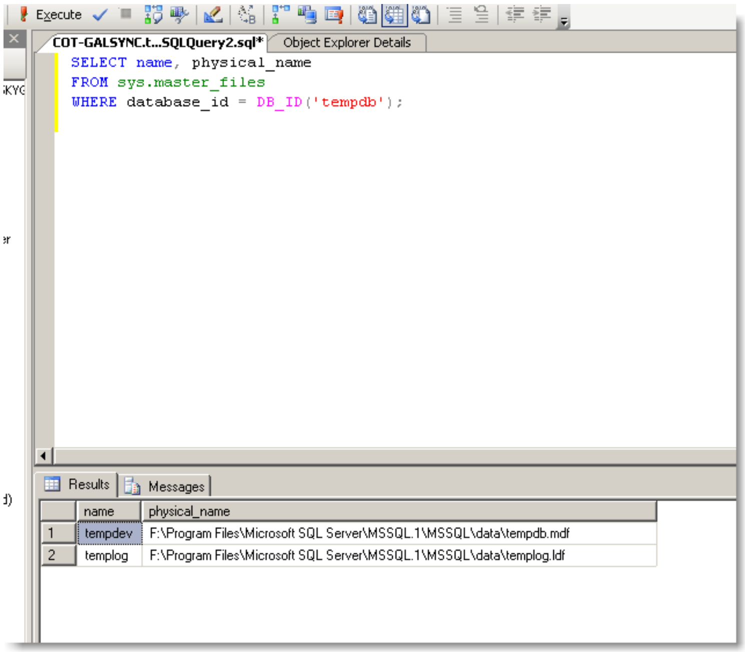
67. Go back to SQL Server Management Studio and open a new query pane.

68. Copy and paste the following to verify that tempdb has moved to the new location:

```
SELECT name, physical_name
FROM sys.master_files
WHERE database_id = DB_ID('tempdb');
```

69. Click Execute.

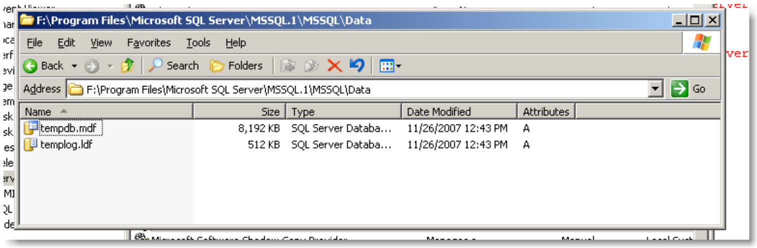
70. In the physical_name column, you should see the path to the new location:



```
SELECT name, physical_name
FROM sys.master_files
WHERE database_id = DB_ID('tempdb');
```

	name	physical_name
1	tempdev	F:\Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\data\tempdb.mdf
2	templog	F:\Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\data\templog.ldf

71. You should also note the new tempdb files in the proper location in the file system, as well.



Address: F:\Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\Data

Name	Size	Type	Date Modified	Attributes
tempdb.mdf	8,192 KB	SQL Server Databa...	11/26/2007 12:43 PM	A
templog.ldf	512 KB	SQL Server Databa...	11/26/2007 12:43 PM	A

IIFP Management Agent Configuration

The configuration of the management agents for the GALSync server is documented below. In order to synchronize your e-mail addresses with the GALSync forest and other agencies, you will need to configure two management agents:

- One for your production forest
- One for the GALSync forest

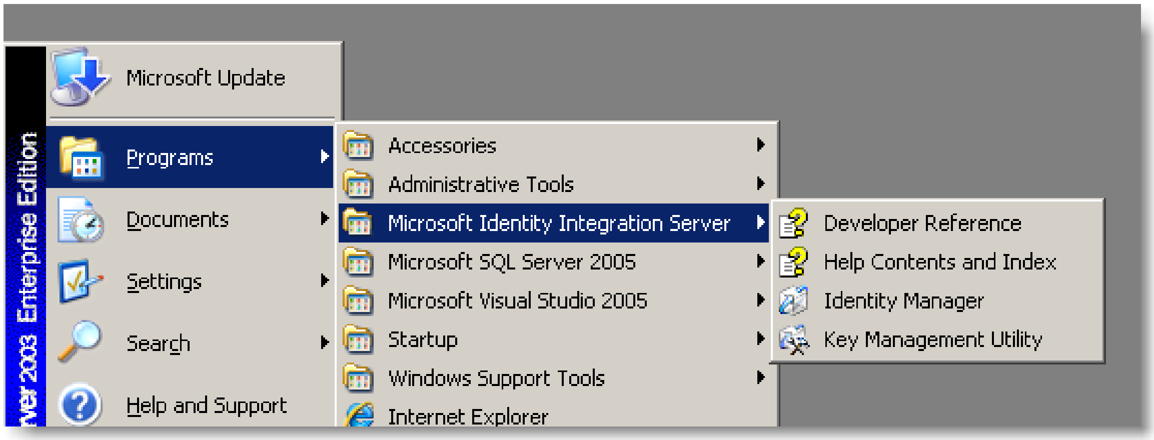
Each management agent (MA) is then responsible for the import/export of data to its respective destination.

Note

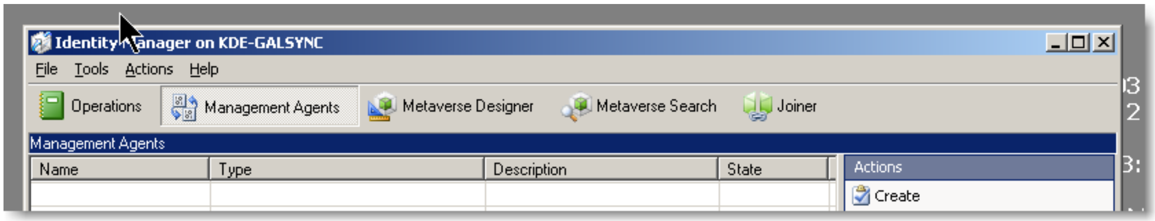
Perform the following configuration logged on to the IIFP server as your production forest GALSync service account.

Production Active Directory forest MA

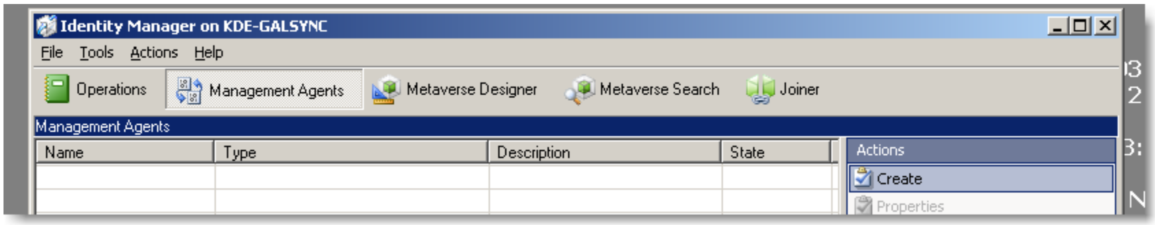
1. Open the Identity Manager



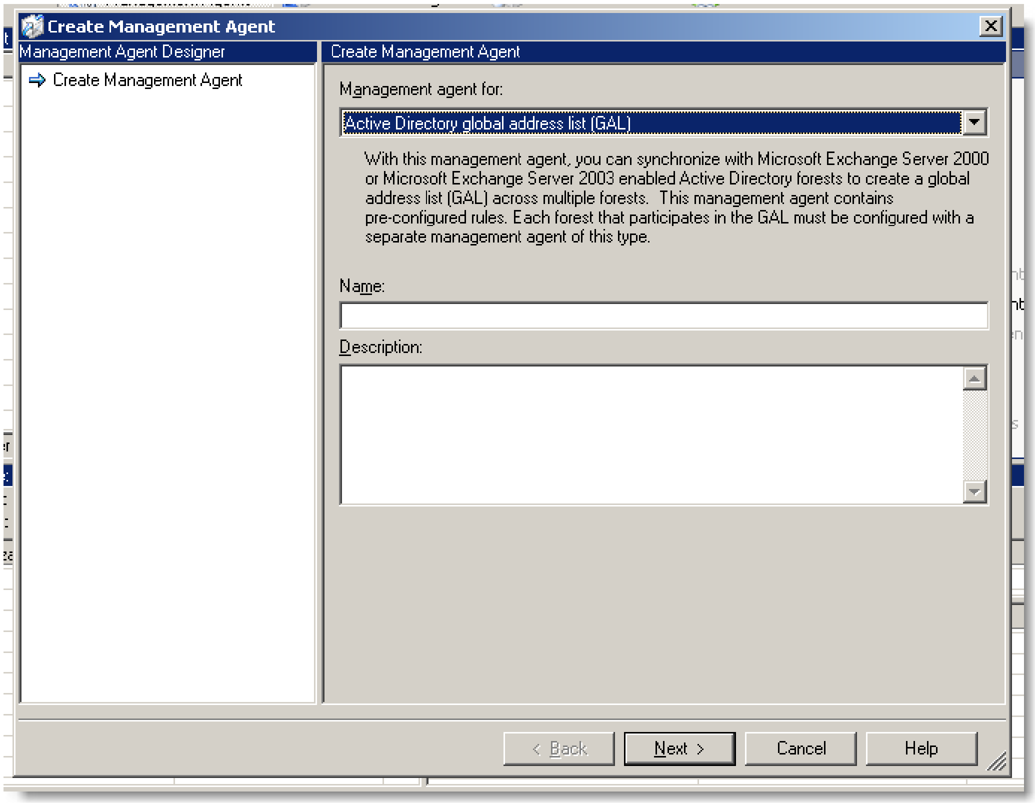
2. Select the 'Management Agent' toolbar button to switch to the MA context.



3. Go to the Actions menu and select Create.



4. On the Create Management Agent screen, specify a Management Agent for – and select 'Active Directory Global Address List (GAL)' from the drop-down combo-box.



Management agent for: Active Directory global address list (GAL)

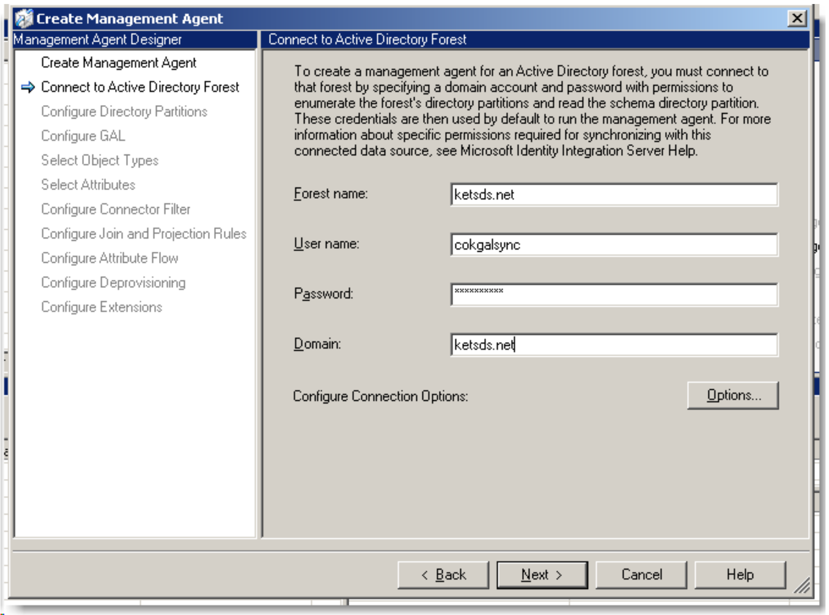
With this management agent, you can synchronize with Microsoft Exchange Server 2000 or Microsoft Exchange Server 2003 enabled Active Directory forests to create a global address list (GAL) across multiple forests. This management agent contains pre-configured rules. Each forest that participates in the GAL must be configured with a separate management agent of this type.

Specify a name for the Management Agent, and then click [Next].

Note

For this management agent, use the agency abbreviation. I.E., KDE for the Kentucky Department of Education, LRC for Legislative Research Commission, COT for the Commonwealth Office of Technology, KRS for Kentucky Retirement Systems, etc.

5. On the **'Connect to Active Directory Forest'** page, enter in the root DNS name of your production forest, along with the GALSync service account (created by you for your forest), its password and the DNS name of the root domain



Create Management Agent

Management Agent Designer

Create Management Agent

Connect to Active Directory Forest

Configure Directory Partitions

Configure GAL

Select Object Types

Select Attributes

Configure Connector Filter

Configure Join and Projection Rules

Configure Attribute Flow

Configure Deprovisioning

Configure Extensions

Connect to Active Directory Forest

To create a management agent for an Active Directory forest, you must connect to that forest by specifying a domain account and password with permissions to enumerate the forest's directory partitions and read the schema directory partition. These credentials are then used by default to run the management agent. For more information about specific permissions required for synchronizing with this connected data source, see Microsoft Identity Integration Server Help.

Forest name: ketsds.net

User name: cokgalsync

Password: **********

Domain: ketsds.net

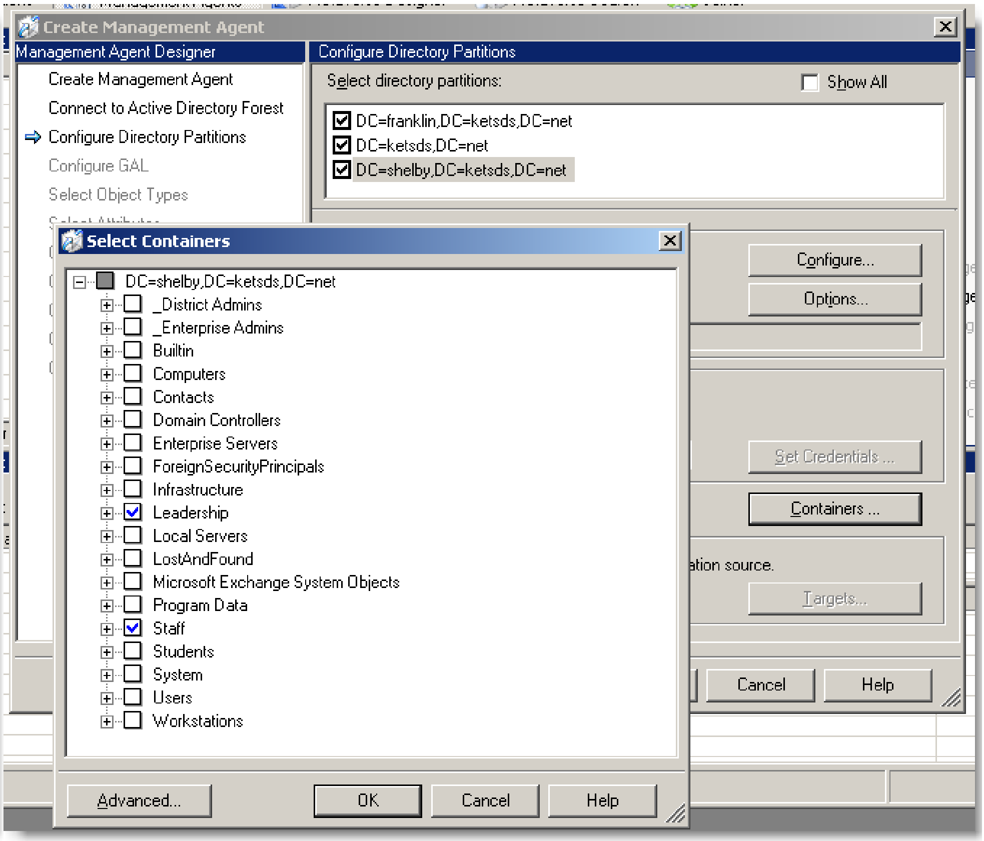
Configure Connection Options: Options...

< Back | Next > | Cancel | Help

and then click [Next]

On the 'Configure Directory Partitions screen', select the Directory Partitions corresponding to the domains that have users that you wish to publish to the GALSync forest and then click the [containers] button to select the OU's within those domains. You will likely find it easier to unselect the root domain object in the containers dialog and then just selectively select what you wish to synchronize.

See the diagram on the right for an example:



Create Management Agent

Management Agent Designer

Create Management Agent

Connect to Active Directory Forest

Configure Directory Partitions

Configure GAL

Select Object Types

Configure Directory Partitions

Select directory partitions: □ Show All

☑ DC=franklin,DC=ketsds,DC=net

☑ DC=ketsds,DC=net

☑ DC=shelby,DC=ketsds,DC=net

Configure... | Options... | Set Credentials ... | Containers ... | Targets... | Cancel | Help

ation source.

Select Containers

■ DC=shelby,DC=ketsds,DC=net

- □ _District Admins
- □ _Enterprise Admins
- □ Builtin
- □ Computers
- □ Contacts
- □ Domain Controllers
- □ Enterprise Servers
- □ ForeignSecurityPrincipals
- □ Infrastructure
- ☑ Leadership
- □ Local Servers
- □ LostAndFound
- □ Microsoft Exchange System Objects
- □ Program Data
- ☑ Staff
- □ Students
- □ System
- □ Users
- □ Workstations

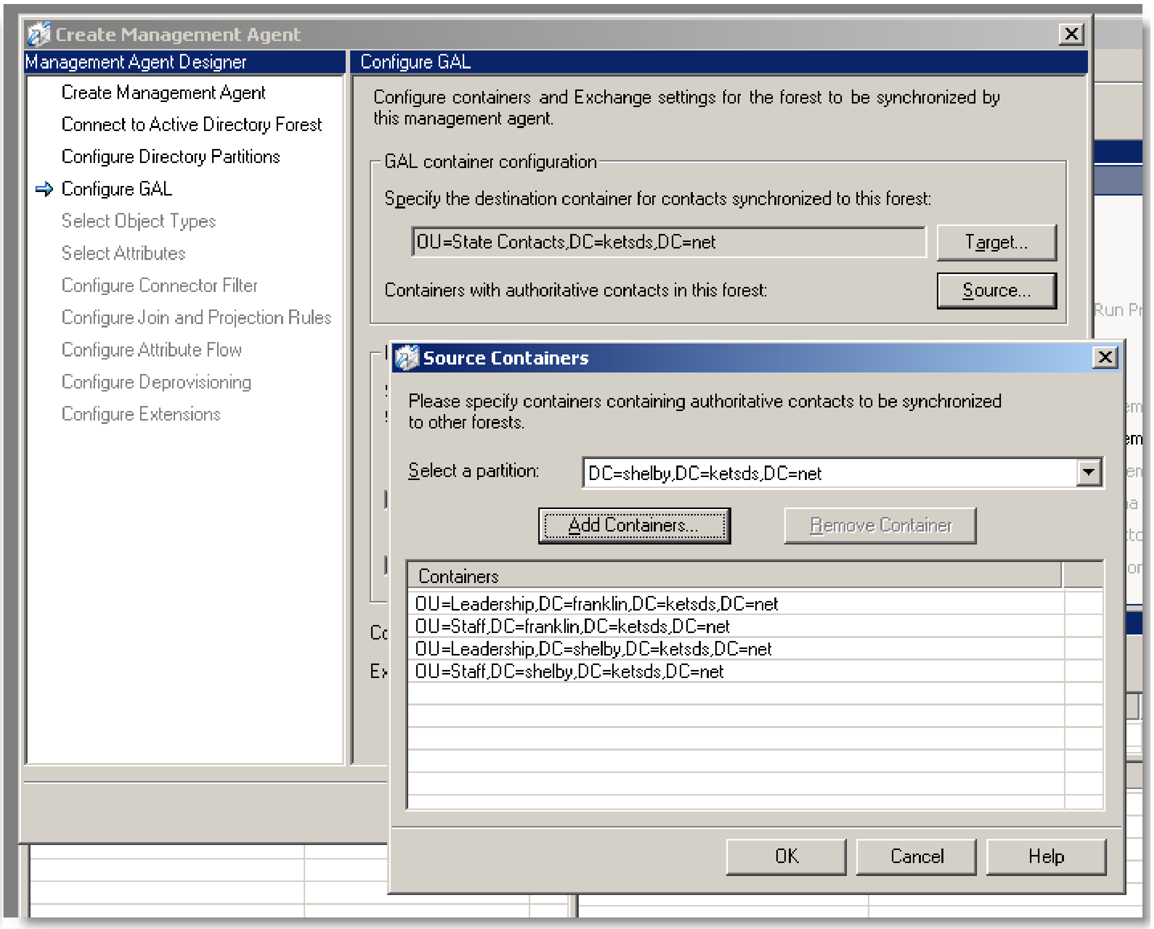
Advanced... | OK | Cancel | Help

Note

Be sure to select the root domain (or whichever domain will hold the contacts synchronized FROM the GALSync forest) AND the 'State Contacts' OU that will hold these synchronized contacts on this page. Failure to do so will prevent the rest of the MA from being configured correctly.

6. On the **'Configure GAL screen'**, navigate to the 'GAL Container Configuration frame and click the [Target] button and select the container that will hold the contacts that are imported from the GALSync forest (which represent every state user except for your agency).

   Click the [Source] button and for each directory partition that you have selected the IIFP to import from (refer to the previous step) specify which OU's contain users that you wish to synchronize to the GALSync forest (for the purpose of every other state agency being able to import into their GAL). Note that if you have multiple domains and multiple OU's to synchronize that this step will likely be fairly lengthy and/or tedious.



Configure containers and Exchange settings for the forest to be synchronized by this management agent.

GAL container configuration

Specify the destination container for contacts synchronized to this forest:

OU=State Contacts,DC=ketsds,DC=net

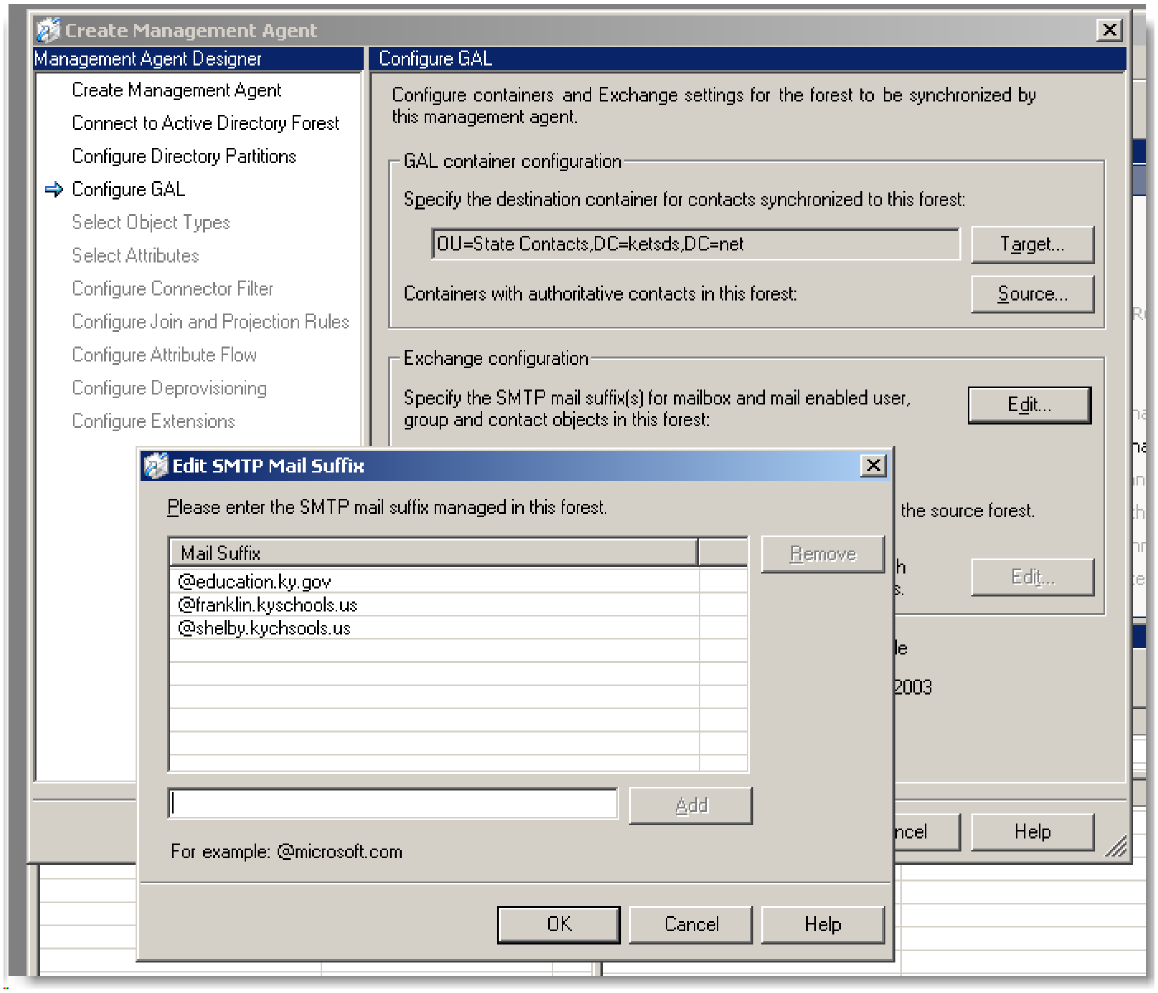
Containers with authoritative contacts in this forest:

Please specify containers containing authoritative contacts to be synchronized to other forests.

Select a partition: DC=shelby,DC=ketsds,DC=net

Containers
OU=Leadership,DC=franklin,DC=ketsds,DC=net
OU=Staff,DC=franklin,DC=ketsds,DC=net
OU=Leadership,DC=shelby,DC=ketsds,DC=net
OU=Staff,DC=shelby,DC=ketsds,DC=net

Once finished adding all of the source containers, then proceed down to the ‘Exchange Configuration’ frame and click the [edit] button to add the listing of authoritative SMTP domains that are in your forest, as shown below:


Create Management Agent

Configure GAL

Configure containers and Exchange settings for the forest to be synchronized by this management agent.

GAL container configuration

Specify the destination container for contacts synchronized to this forest:

OU=State Contacts,DC=ketsds,DC=net

Containers with authoritative contacts in this forest:

Exchange configuration

Specify the SMTP mail suffix(s) for mailbox and mail enabled user, group and contact objects in this forest:

Edit SMTP Mail Suffix

Please enter the SMTP mail suffix managed in this forest.

Mail Suffix
@education.ky.gov
@franklin.kyschools.us
@shelby.kychsools.us

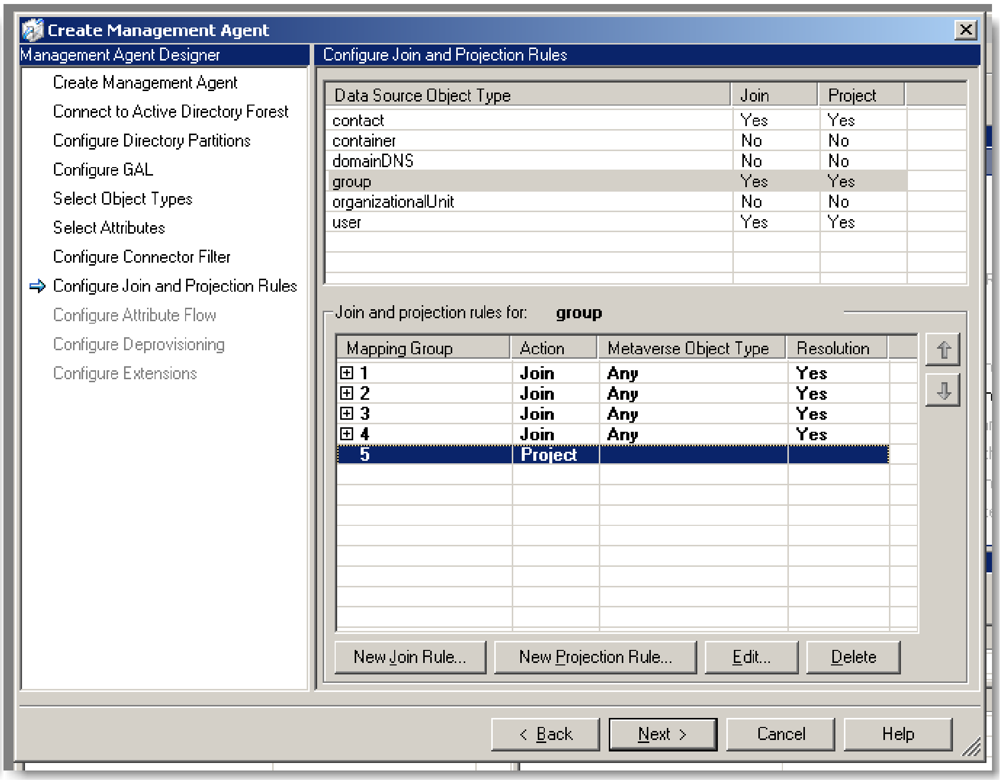
For example: @microsoft.com

click [OK] to accept all of the SMTP domains you have entered into the dialog box, and then click [Next] to proceed to the next step. Leave all other settings at their default for this page!

7. On the ‘Select Object Types’ page, leave all options at their defaults and click [Next]

8. On the ‘Configure Connector Filter’ page, leave all options at their defaults and click [Next]

9. On the 'Configure Join and Project Rules' page, select 'group' from the 'Data Source Object Type' column, then select its project rule from the 'Join and projection rules for: group' frame and click [Delete].



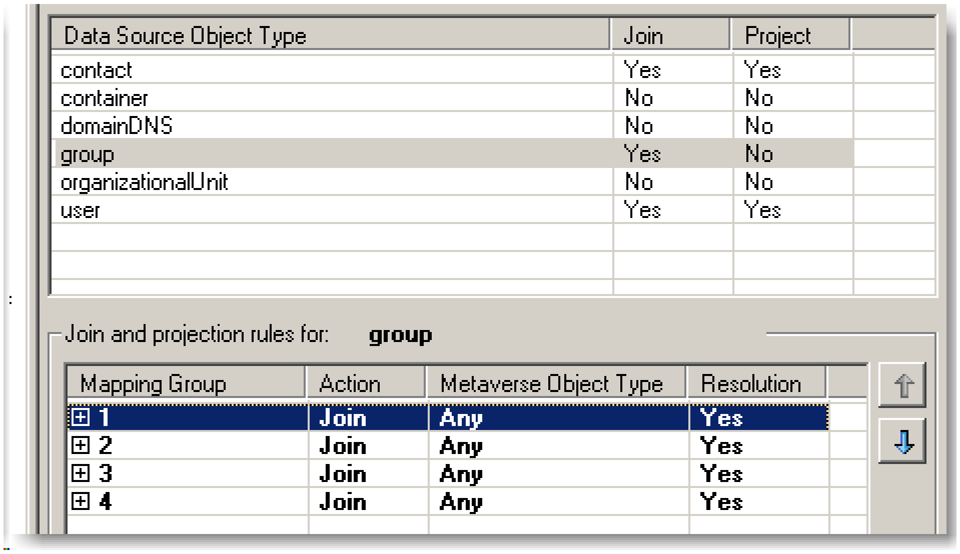
Configure Join and Projection Rules

Data Source Object Type	Join	Project
contact	Yes	Yes
container	No	No
domainDNS	No	No
group	Yes	Yes
organizationalUnit	No	No
user	Yes	Yes

Join and projection rules for: **group**

Mapping Group	Action	Metaverse Object Type	Resolution
⊞ 1	Join	Any	Yes
⊞ 2	Join	Any	Yes
⊞ 3	Join	Any	Yes
⊞ 4	Join	Any	Yes
5	Project		

After making this configuration change, the screen should look like the following:



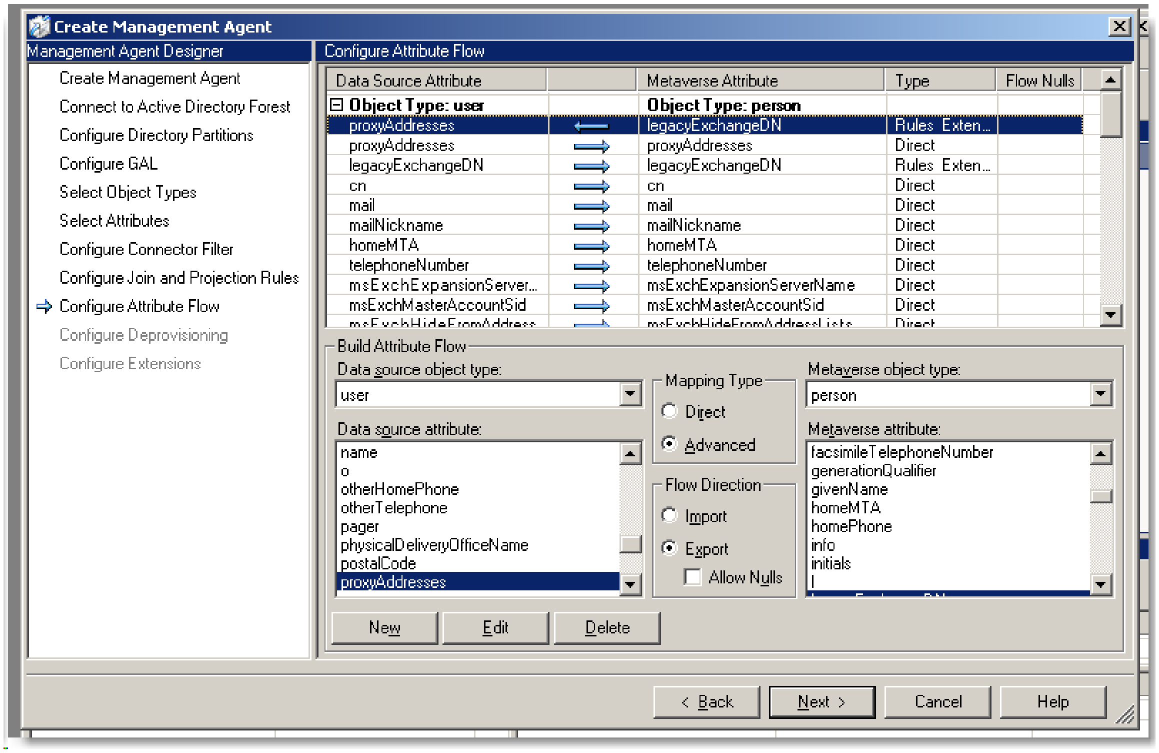
Data Source Object Type	Join	Project
contact	Yes	Yes
container	No	No
domainDNS	No	No
group	Yes	No
organizationalUnit	No	No
user	Yes	Yes

Join and projection rules for: **group**

Mapping Group	Action	Metaverse Object Type	Resolution
⊞ 1	Join	Any	Yes
⊞ 2	Join	Any	Yes
⊞ 3	Join	Any	Yes
⊞ 4	Join	Any	Yes

Click [Next] to proceed.

10. On the ‘Configure Attribute Flow’ page, expand the Object Type: user to Object Type: person. Click the ‘ProxyAddresses’ <- ‘legacyExchangeDN’ attribute flow so that it is highlighted.



Configure Attribute Flow

Data Source Attribute		Metaverse Attribute	Type	Flow Nulls
⊟ **Object Type: user**		**Object Type: person**		
proxyAddresses	←	legacyExchangeDN	Rules Exten...	
proxyAddresses	→	proxyAddresses	Direct	
legacyExchangeDN	→	legacyExchangeDN	Rules Exten...	
cn	→	cn	Direct	
mail	→	mail	Direct	
mailNickname	→	mailNickname	Direct	
homeMTA	→	homeMTA	Direct	
telephoneNumber	→	telephoneNumber	Direct	
msExchExpansionServer...	→	msExchExpansionServerName	Direct	
msExchMasterAccountSid	→	msExchMasterAccountSid	Direct	
msExchHideFromAddress	→	msExchHideFromAddressLists	Direct	

Build Attribute Flow

Data source object type: user

Data source attribute:
name
o
otherHomePhone
otherTelephone
pager
physicalDeliveryOfficeName
postalCode
proxyAddresses

Mapping Type
○ Direct
● Advanced

Flow Direction
○ Import
● Export
□ Allow Nulls

Metaverse object type: person

Metaverse attribute:
facsimileTelephoneNumber
generationQualifier
givenName
homeMTA
homePhone
info
initials

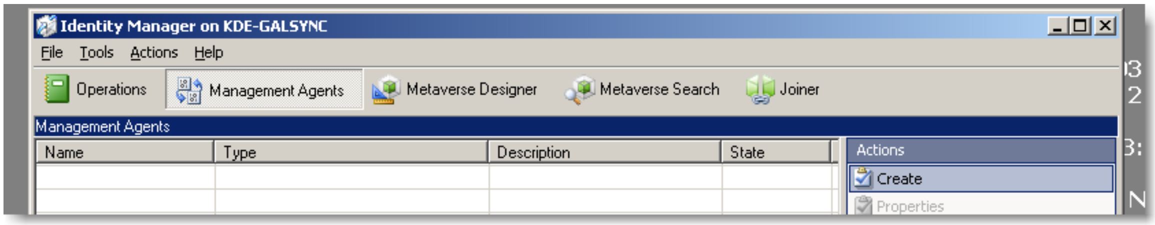
Click [Delete] to remove the attribute flow mapping, and then click [Next] to continue.

11. On the ‘Configure Deprovisioning’ page, accept all defaults, and click [Next] to continue.

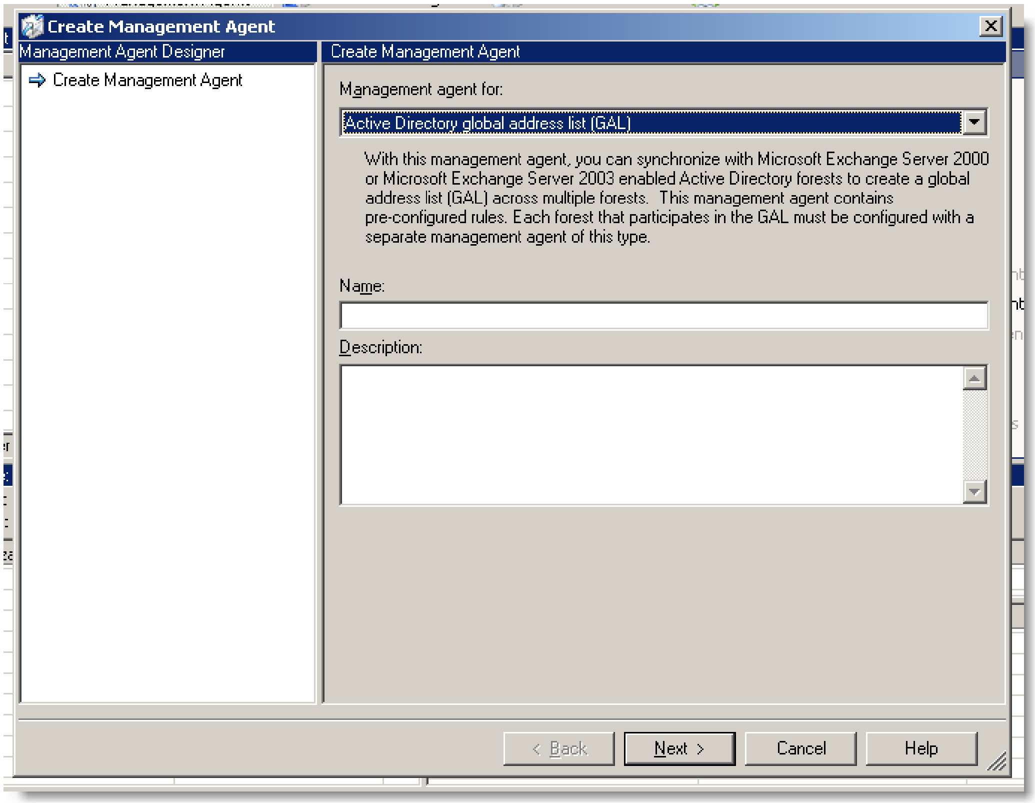
12. On the ‘Configure Extensions’ page, accept all defaults and click [Finish] to complete configuration of the MA and allow the IIFP to create the MA with these options.

COK Galsync Forest MA

1. Go to the Actions menu and select Create.



2. On the Create Management Agent screen, specify a Management Agent for – and select 'Active Directory Global Address List (GAL)' from the drop-down combo-box.

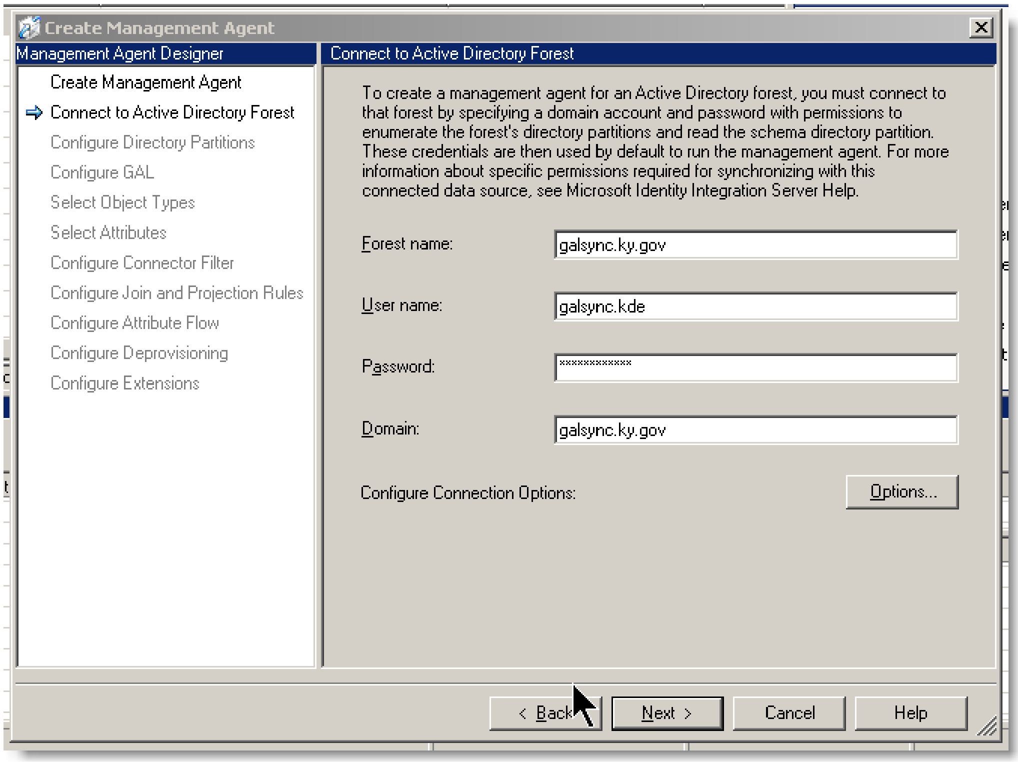


Active Directory global address list (GAL)

With this management agent, you can synchronize with Microsoft Exchange Server 2000 or Microsoft Exchange Server 2003 enabled Active Directory forests to create a global address list (GAL) across multiple forests. This management agent contains pre-configured rules. Each forest that participates in the GAL must be configured with a separate management agent of this type.

Specify the name for the Management Agent to be 'GALSync Forest' and then click [Next].

3. On the **'Connect to Active Directory Forest'** page, enter in the root DNS name of your production forest, along with the GALSync service account (created by you for your forest), its password and the DNS name of the root domain



Connect to Active Directory Forest

To create a management agent for an Active Directory forest, you must connect to that forest by specifying a domain account and password with permissions to enumerate the forest's directory partitions and read the schema directory partition. These credentials are then used by default to run the management agent. For more information about specific permissions required for synchronizing with this connected data source, see Microsoft Identity Integration Server Help.

Forest name: galsync.ky.gov

User name: galsync.kde

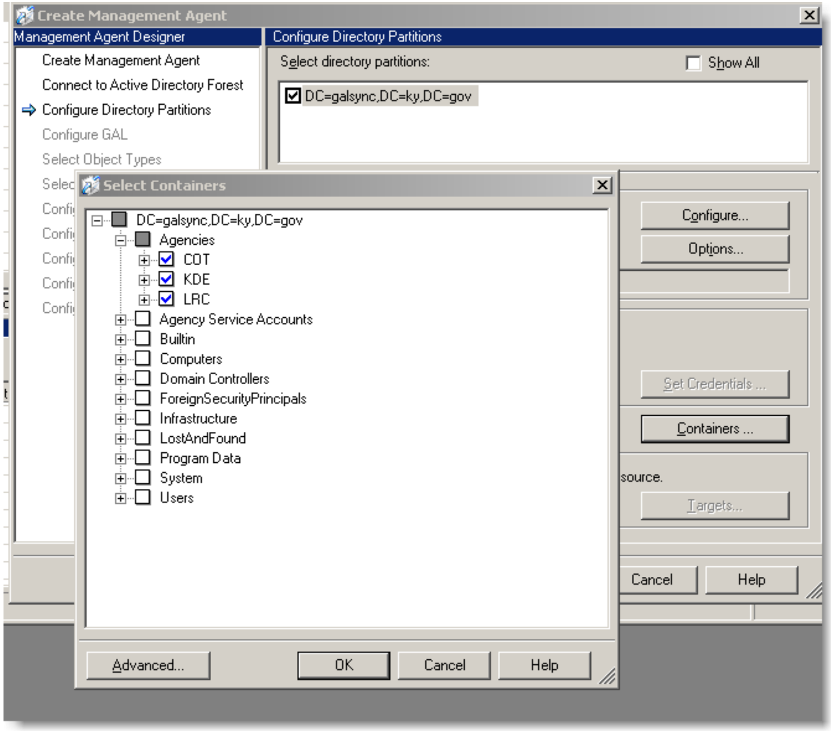
Password: ************

Domain: galsync.ky.gov

Configure Connection Options:

and then click [Next]

4. On the 'Configure Directory Partitions' page, place a checkbox in the 'DC=GALSync,DC=ky,DC=gov' partition, then click the [Containers] button to bring up the following dialog to select the containers that you wish to receive contacts from (corresponding to the agencies that you wish to see in your GAL). Be sure to select your own container in this screen as well. We will differentiate between the OU's next. Click on [OK] to close this dialog when finished and then click on [Next] button to continue.



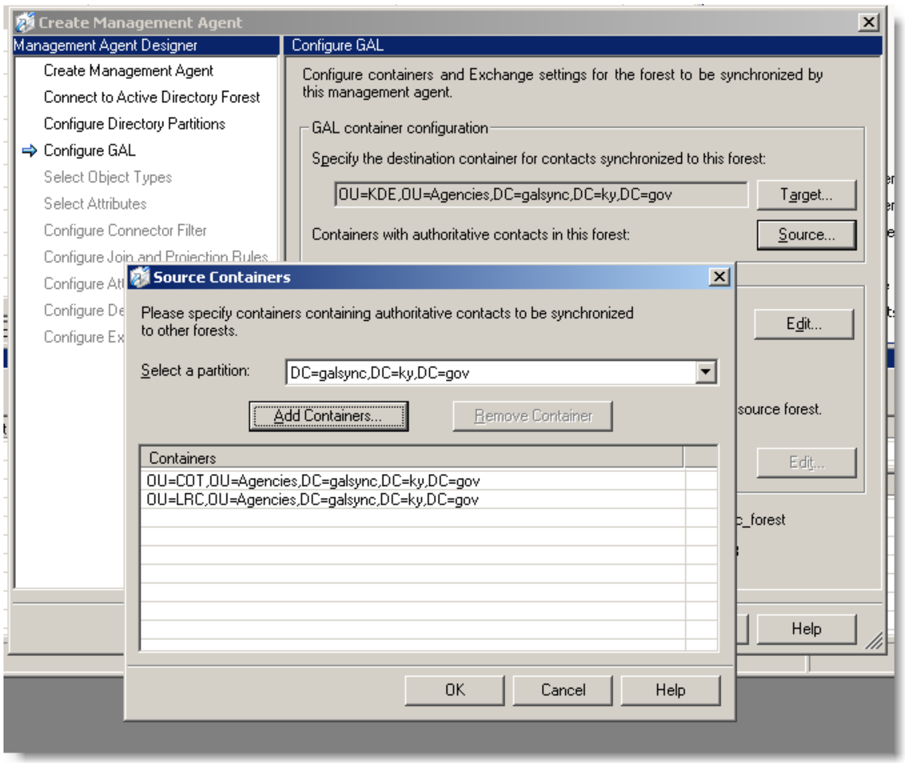
Select directory partitions:

☑ DC=galsync,DC=ky,DC=gov

Select Containers:

- ■ DC=galsync,DC=ky,DC=gov
  - ■ Agencies
    - ☑ COT
    - ☑ KDE
    - ☑ LRC
  - □ Agency Service Accounts
  - □ Builtin
  - □ Computers
  - □ Domain Controllers
  - □ ForeignSecurityPrincipals
  - □ Infrastructure
  - □ LostAndFound
  - □ Program Data
  - □ System
  - □ Users

5. On the 'Configure GAL' page click the [Target] button to select the OU that your agency 'owns' in the GALSync forest. This container will be named after your agency and will be the OU that all of your mail and mailbox-enabled users will be written to the GALSync forest as contacts.



Configure containers and Exchange settings for the forest to be synchronized by this management agent.

Specify the destination container for contacts synchronized to this forest: OU=KDE,OU=Agencies,DC=galsync,DC=ky,DC=gov

Containers with authoritative contacts in this forest:

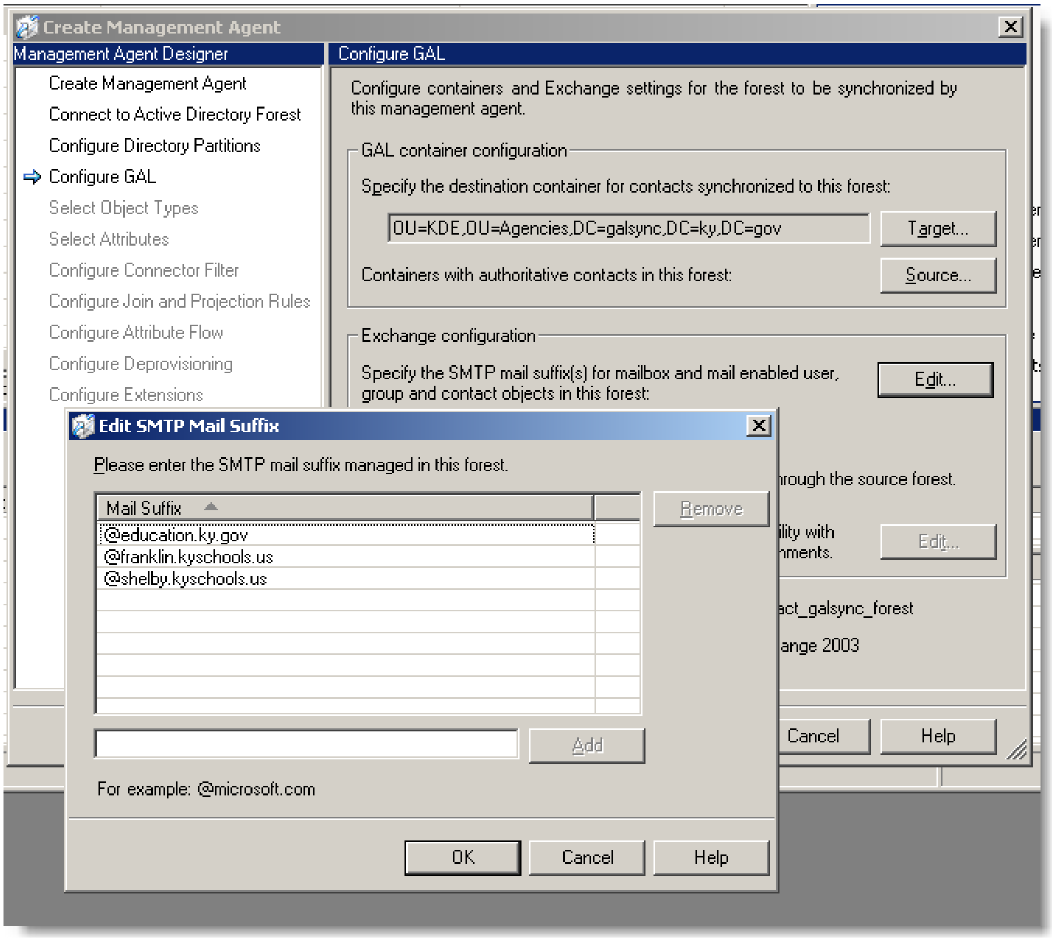
Please specify containers containing authoritative contacts to be synchronized to other forests.

Select a partition: DC=galsync,DC=ky,DC=gov

Containers
OU=COT,OU=Agencies,DC=galsync,DC=ky,DC=gov
OU=LRC,OU=Agencies,DC=galsync,DC=ky,DC=gov

After selecting your synchronization OU, click the [Source] button to select the containers that hold the contacts that you wish to show up in your GAL. You have total control as to which containers you select here, and you are not required to synchronize an agency if you do not want to see their users in your GAL. Click [OK] when finished.

6. Click the [Edit] button in the ‘Exchange Configuration’ frame and enter in all of the SMTP suffixes that your forest is authoritative for, as shown below:



Create Management Agent

Configure GAL

Configure containers and Exchange settings for the forest to be synchronized by this management agent.

GAL container configuration

Specify the destination container for contacts synchronized to this forest:

OU=KDE,OU=Agencies,DC=galsync,DC=ky,DC=gov

Containers with authoritative contacts in this forest:

Exchange configuration

Specify the SMTP mail suffix(s) for mailbox and mail enabled user, group and contact objects in this forest:

rough the source forest.

ility with
nments.

act_galsync_forest

ange 2003

Edit SMTP Mail Suffix

Please enter the SMTP mail suffix managed in this forest.

Mail Suffix
@education.ky.gov
@franklin.kyschools.us
@shelby.kyschools.us

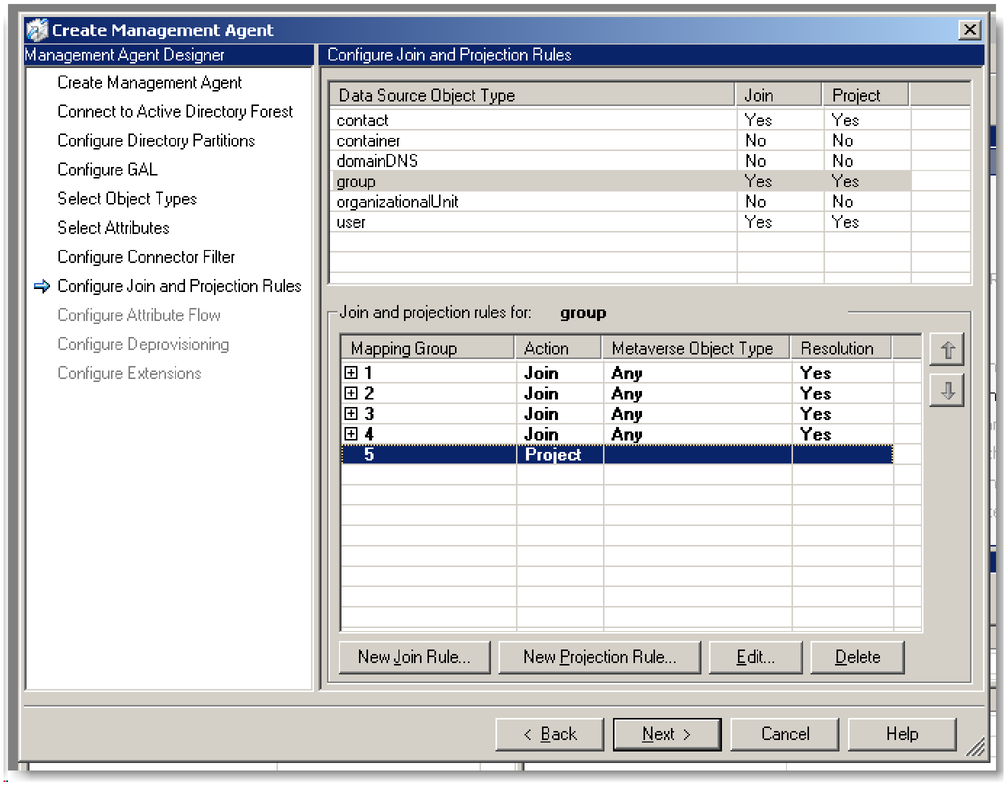
For example: @microsoft.com

Click [OK] when finished and then click [Next] to proceed.

7. On the ‘Select Object Types’ page, leave all options at their defaults and click [Next]

8. On the ‘Configure Connector Filter’ page, leave all options at their defaults and click [Next]

9. On the 'Configure Join and Project Rules' page, select 'group' from the 'Data Source Object Type' column, then select its project rule from the 'Join and projection rules for: group' frame and click [Delete].

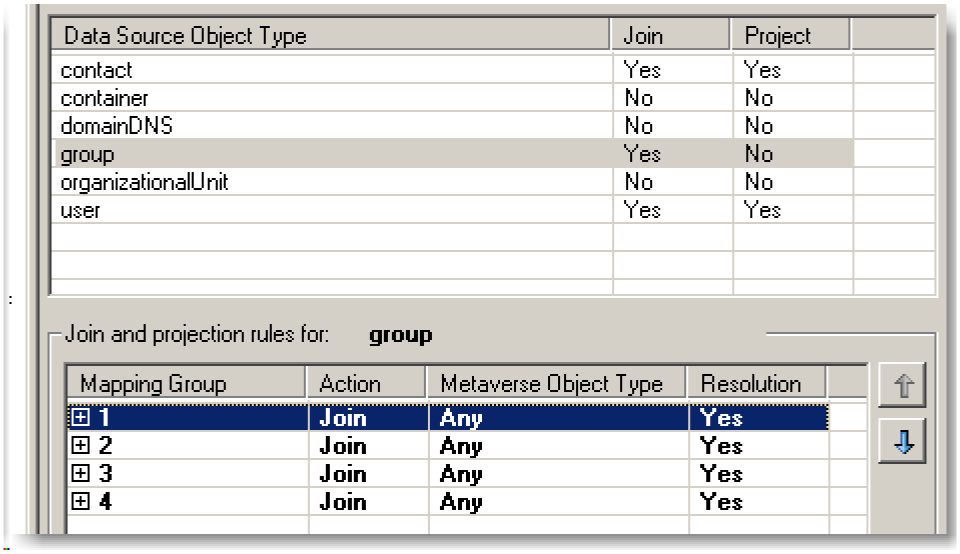


Data Source Object Type	Join	Project
contact	Yes	Yes
container	No	No
domainDNS	No	No
group	Yes	Yes
organizationalUnit	No	No
user	Yes	Yes

Join and projection rules for: **group**

Mapping Group	Action	Metaverse Object Type	Resolution
⊞ 1	**Join**	**Any**	**Yes**
⊞ 2	**Join**	**Any**	**Yes**
⊞ 3	**Join**	**Any**	**Yes**
⊞ 4	**Join**	**Any**	**Yes**
5	**Project**		

After making this configuration change, the screen should look like the following:



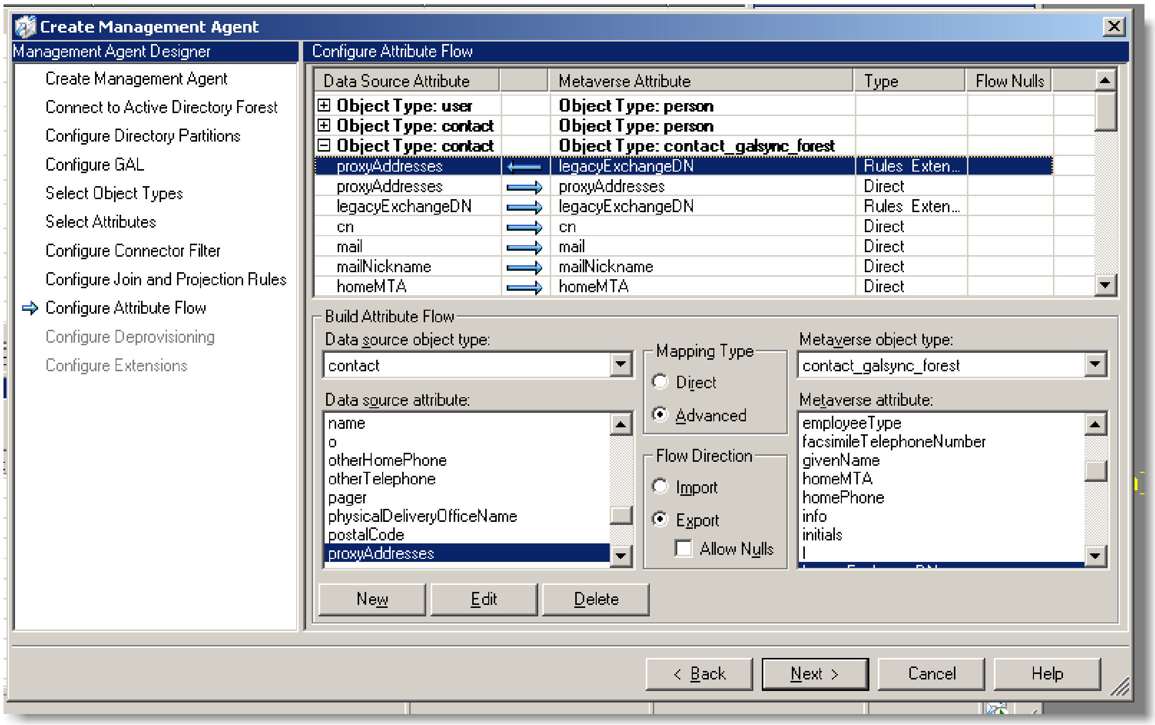
Data Source Object Type	Join	Project
contact	Yes	Yes
container	No	No
domainDNS	No	No
group	Yes	No
organizationalUnit	No	No
user	Yes	Yes

Join and projection rules for: **group**

Mapping Group	Action	Metaverse Object Type	Resolution
⊞ 1	**Join**	**Any**	**Yes**
⊞ 2	**Join**	**Any**	**Yes**
⊞ 3	**Join**	**Any**	**Yes**
⊞ 4	**Join**	**Any**	**Yes**

Click [Next] to proceed.

10. On the 'Configure Attribute Flow' page, expand the Object Type: contact to Object Type: cot_galsync_forest. Click the 'ProxyAddresses' <- 'legacyExchangeDN' attribute flow so that it is highlighted.



Configure Attribute Flow

Data Source Attribute		Metaverse Attribute	Type	Flow Nulls
⊞ **Object Type: user**		**Object Type: person**		
⊞ **Object Type: contact**		**Object Type: person**		
⊟ **Object Type: contact**		**Object Type: contact_galsync_forest**		
proxyAddresses	←	legacyExchangeDN	Rules Exten...	
proxyAddresses	→	proxyAddresses	Direct	
legacyExchangeDN	→	legacyExchangeDN	Rules Exten...	
cn	→	cn	Direct	
mail	→	mail	Direct	
mailNickname	→	mailNickname	Direct	
homeMTA	→	homeMTA	Direct	

Build Attribute Flow

Data source object type: contact

Data source attribute:
name
o
otherHomePhone
otherTelephone
pager
physicalDeliveryOfficeName
postalCode
proxyAddresses

Mapping Type: ○ Direct ● Advanced

Flow Direction: ○ Import ● Export

□ Allow Nulls

Metaverse object type: contact_galsync_forest

Metaverse attribute:
employeeType
facsimileTelephoneNumber
givenName
homeMTA
homePhone
info
initials
l

Click [Delete] to remove the attribute flow mapping, and then click [Next] to continue.

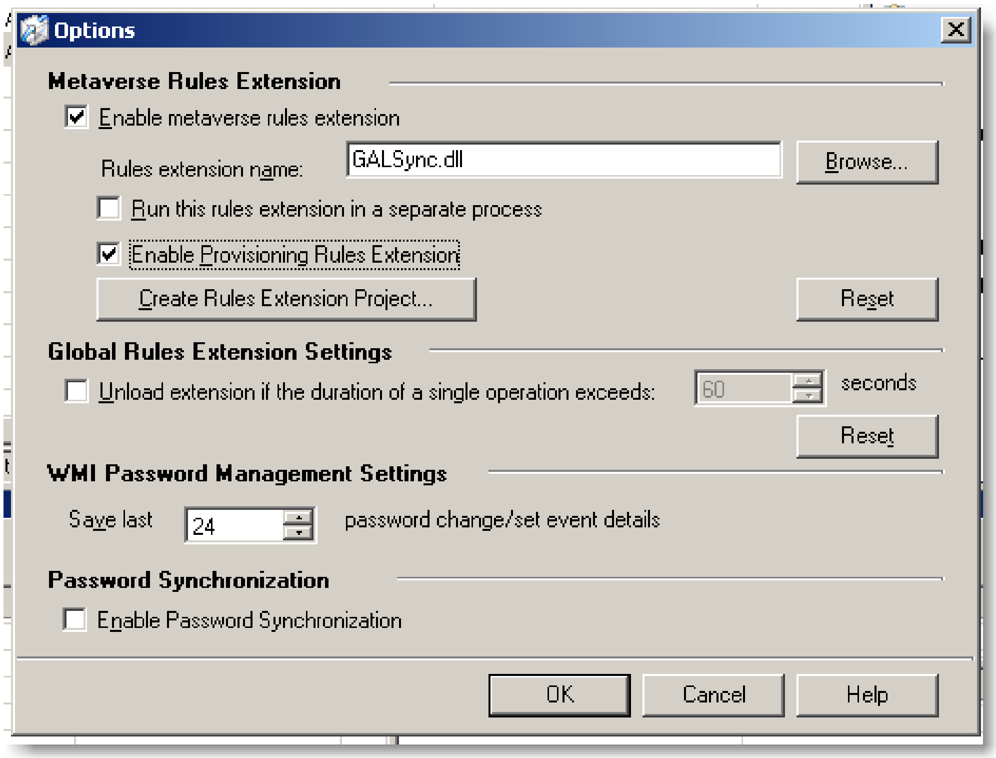
13. On the 'Configure Deprovisioning' page, accept all defaults, and click [Next] to continue.

11. On the 'Configure Extensions' page, accept all defaults and click [Finish] to complete configuration of the MA and allow the IIFP to create the MA with these options.

IIFP Server General Configuration Options

Once the MA configurations have been completed, go back to the main Identity Manager window, and select the Tools/Options menu and turn on the provisioning rules extensions (with the checkbox shown below) and click [OK] to save the changes.

If this is not enabled, then provisioning (creation of new contacts) will not run and although synchronization will appear to work correctly, nothing will be created in either forest.



Options

Metaverse Rules Extension

☑ Enable metaverse rules extension

Rules extension name: GALSync.dll

☐ Run this rules extension in a separate process

☑ Enable Provisioning Rules Extension

Global Rules Extension Settings

☐ Unload extension if the duration of a single operation exceeds: 60 seconds

WMI Password Management Settings

Save last 24 password change/set event details

Password Synchronization

☐ Enable Password Synchronization

IIFP Extension Code Update

Browse to the ‘IIFP\Extension Code’ folder on the ‘COK GALSync Resources’ CD. Notice the single ‘GALSync.dll’ file in that folder. Copy that file to the ‘C:\Program Files\Microsoft Identity Integration Server\Extensions’ folder and overwrite the existing GALSync.dll file (make sure to keep a backup of the ‘as-installed’ file!!)

IIFP Attribute Synchronization Configuration

The default configuration of the management agents (as has been configured thus far) will synchronize the following attributes from your production Active Directory forest to the GALSync forest and from the other agencies into your production Active Directory forest (as contacts):

Listing 1 – Primary Attributes

1. company
2. department
3. displayName
4. givenName (first name)
5. l (city)
6. mailNickname (mail alias)
7. physicalDeliveryOfficeName (office)
8. postalCode (zipcode)
9. Sn (last name)
10. St (state)
11. streetAddress
12. targetAddress (e-mail address for contact)
13. telephoneNumber
14. title

Listing 2 – Secondary Attributes

1. cname
2. groupType
3. hideDLMembership
4. homeMDB
5. homeMTA
6. legacyExchangeDN
7. mail
8. mAPIRecipient
9. msExchExpansionServerName
10. msExchHomeServerName
11. msExchMasterAccountSid
12. msExchOriginatingForest
13. msExchPoliciesExcluded
14. msExchHideFromAddressLists
15. nTGroupMembers
16. ProxyAddresses

Listing 3 – Ancillary Attributes

1. c
2. co
3. division
4. employeeID

5. employeeType
6. facsimilieTelephoneNumber
7. homePhone
8. info
9. initials
10. manager
11. mobile
12. msExchAssistantName
13.
14. name
15. o
16. otherHomePhone
17. otherTelephone
18. pager
19. telephoneAssistant
20. userCertificate
21. userSMIMECertificate

The attributes listed above are broken down as follows:

1. The attributes in **'Listing 1'** are the 14 agreed-upon attributes that will be exchanged as part of the GALSync solution.
2. The attributes in **'Listing 2'** are attributes that are 'internal' to the GALSync process and are required in order for the process to work correctly, but will never show up in a participating agency's GAL, so the information in these attributes is deemed 'safe' to synchronize and doesn't compromise any participating entity in any way, shape or form.
3. The attributes in **Listing 3** are attributes that are not part of the 14 agreed-upon attributes and are not essential to the GALSync solution working correctly. Under the default configuration, whatever data is in these attributes will be synchronized to the GALSync forest and will be pulled from the GALSync forest and populated on the synchronized contacts from the other agencies and could potentially show up in your GAL.

Note

If either of these scenarios present a data protection risk for your agency, then you are advised to 'turn off' the offending attributes and choose to either not push them to the GALSync forest for other agencies to have in their GAL and/or not pull them from the GALSync forest and publish them to your GAL. Since each participating agency owns its GALSync server, it is the participating agency's responsibility to properly configure the IIFP to only synchronize what is deemed 'safe'.

COT bears no responsibility for an agency accidentally publishing inappropriate data and bears no responsibility for an agency accidentally synchronizing inappropriate data into their forest.

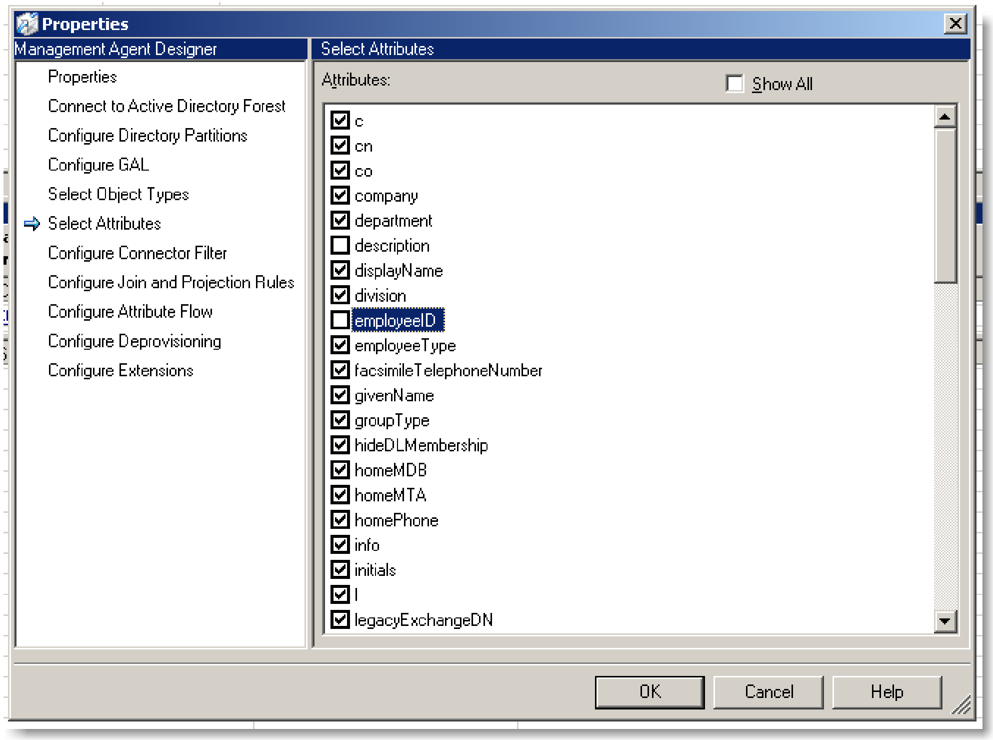
In order to configure your management agents to not synchronize a specific attribute, perform the following:

In this example, we will turn off the replication of the 'employeeID' attribute. Disabling replicate of any other attribute will follow the same principle and configuration steps.

Note

In order to control what is synchronized from your production Active Directory forest to the GALSync forest you must modify the MA for your Active Directory forest. In order to control what is synchronized from other agencies into your GAL, you must modify the 'GALSync Forest' MA.

1. Open the properties of the management agent in question, and go to the 'Select Attributes' page:



Properties

Management Agent Designer

- Properties
- Connect to Active Directory Forest
- Configure Directory Partitions
- Configure GAL
- Select Object Types
- Select Attributes
- Configure Connector Filter
- Configure Join and Projection Rules
- Configure Attribute Flow
- Configure Deprovisioning
- Configure Extensions

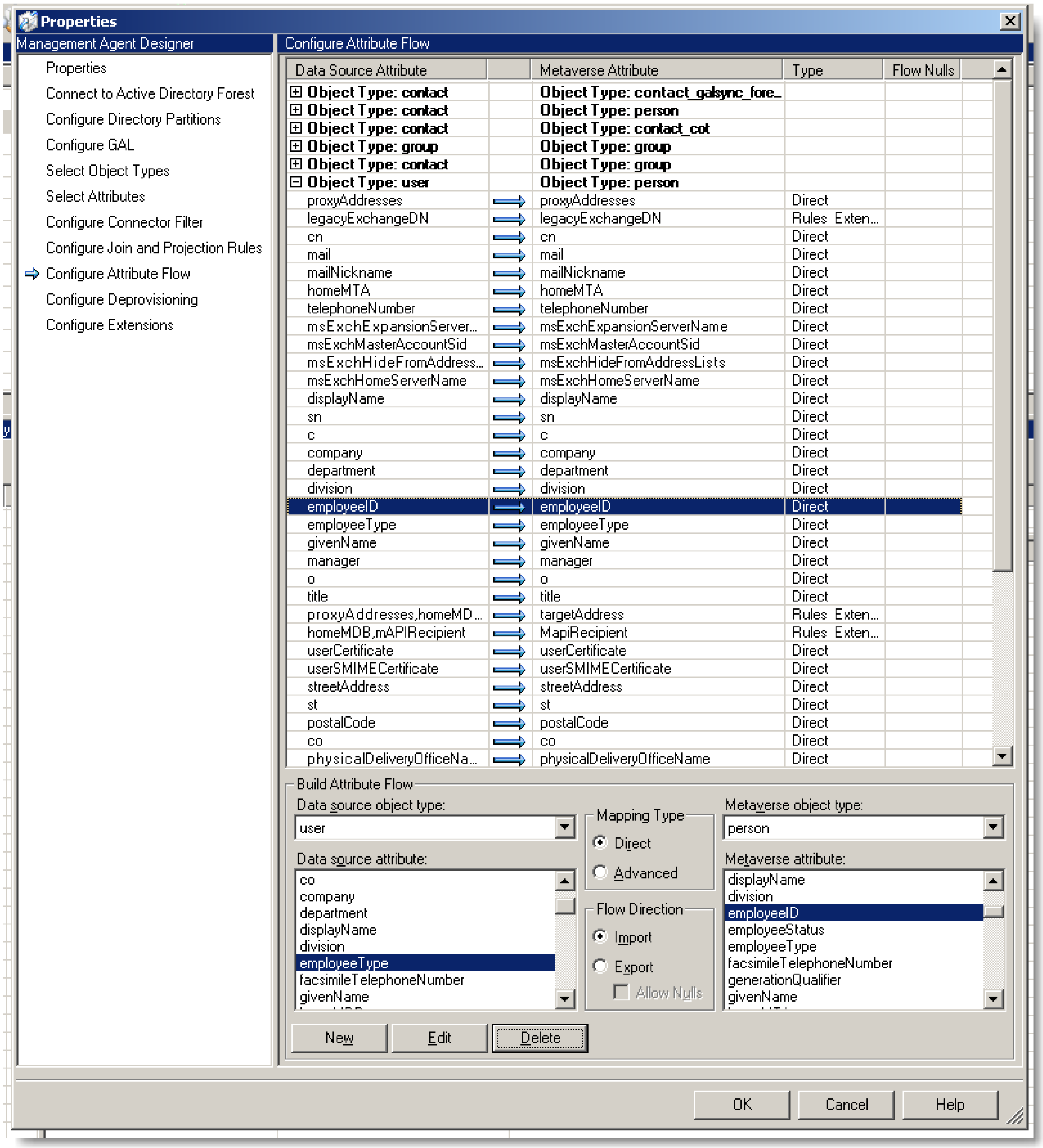
Select Attributes

Attributes: ☐ Show All

☑ c
☑ cn
☑ co
☑ company
☑ department
☐ description
☑ displayName
☑ division
☐ employeeID
☑ employeeType
☑ facsimileTelephoneNumber
☑ givenName
☑ groupType
☑ hideDLMembership
☑ homeMDB
☑ homeMTA
☑ homePhone
☑ info
☑ initials
☑ l
☑ legacyExchangeDN

2. Select the 'employeeID' attribute and uncheck the checkbox next to the name to deselect it from being managed by this MA.

3. Now select the 'Configure Attribute Flow' page and click [Delete] to remove the attribute mapping where desired. In order to completely negate the flow of this attribute, it must be removed as an import flow from the 'user' to 'person' object mapping, the export flow from the 'contact' to 'contact_galsync_forest' object mapping, the export flow from the 'contact' to 'person' object mapping and the import flow from the 'contact' to 'contact_cot' object mapping, as shown below:



Data Source Attribute		Metaverse Attribute	Type	Flow Nulls
⊞ **Object Type: contact**		**Object Type: contact_galsync_fore...**		
⊞ **Object Type: contact**		**Object Type: person**		
⊞ **Object Type: contact**		**Object Type: contact_cot**		
⊞ **Object Type: group**		**Object Type: group**		
⊞ **Object Type: contact**		**Object Type: group**		
⊟ **Object Type: user**		**Object Type: person**		
proxyAddresses	→	proxyAddresses	Direct	
legacyExchangeDN	→	legacyExchangeDN	Rules Exten...	
cn	→	cn	Direct	
mail	→	mail	Direct	
mailNickname	→	mailNickname	Direct	
homeMTA	→	homeMTA	Direct	
telephoneNumber	→	telephoneNumber	Direct	
msExchExpansionServer...	→	msExchExpansionServerName	Direct	
msExchMasterAccountSid	→	msExchMasterAccountSid	Direct	
msExchHideFromAddress...	→	msExchHideFromAddressLists	Direct	
msExchHomeServerName	→	msExchHomeServerName	Direct	
displayName	→	displayName	Direct	
sn	→	sn	Direct	
c	→	c	Direct	
company	→	company	Direct	
department	→	department	Direct	
division	→	division	Direct	
employeeID	→	employeeID	Direct	
employeeType	→	employeeType	Direct	
givenName	→	givenName	Direct	
manager	→	manager	Direct	
o	→	o	Direct	
title	→	title	Direct	
proxyAddresses,homeMD...	→	targetAddress	Rules Exten...	
homeMDB,mAPIRecipient	→	MapiRecipient	Rules Exten...	
userCertificate	→	userCertificate	Direct	
userSMIMECertificate	→	userSMIMECertificate	Direct	
streetAddress	→	streetAddress	Direct	
st	→	st	Direct	
postalCode	→	postalCode	Direct	
co	→	co	Direct	
physicalDeliveryOfficeNa...	→	physicalDeliveryOfficeName	Direct	

Build Attribute Flow

Data source object type: user

Data source attribute: co, company, department, displayName, division, employeeType (selected), facsimileTelephoneNumber, givenName

Mapping Type: ● Direct ○ Advanced

Flow Direction: ● Import ○ Export □ Allow Nulls

Metaverse object type: person

Metaverse attribute: displayName, division, employeeID (selected), employeeStatus, employeeType, facsimileTelephoneNumber, generationQualifier, givenName

4. Once finished, click [OK] to save the MA configuration

5. Repeat the above process for any other attribute on the ‘Ancillary Attributes’ list that you wish to remove from your configuration.

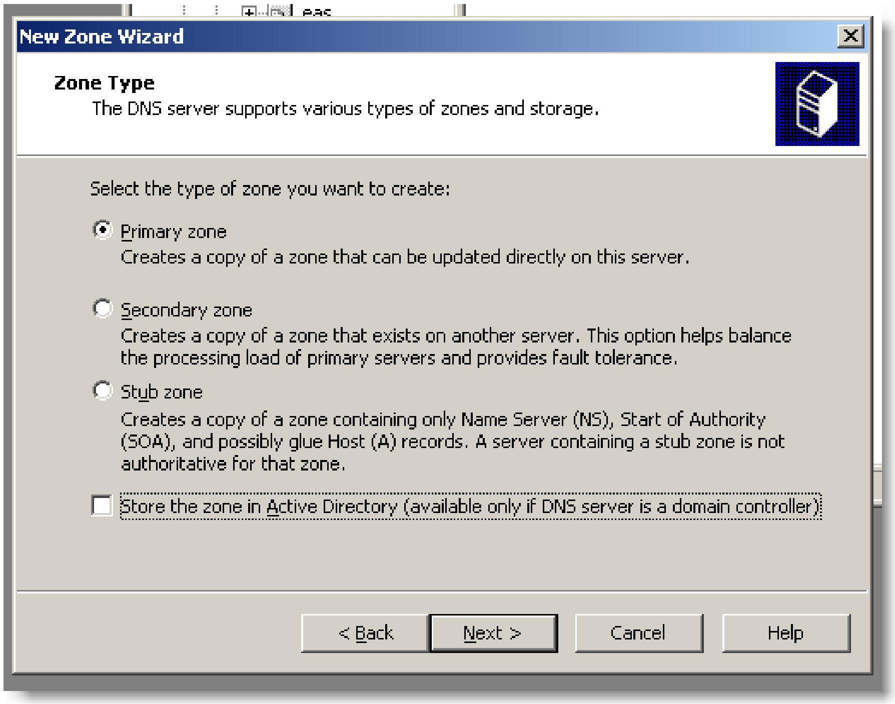
Active Directory

This section details the configuration changes that will need to be made to Active Directory in order to support location of the GALSync forest domain controllers and authentication to the servers.

DNS

Perform the following on a DNS server (domain controller) in the domain where the GALSync server is installed:

1. Start the DNS manager
2. Expand the DNS tree down to the ‘Forward Lookup Zones’ node
3. Right-click and select ‘New Zone…’ from the context menu
4. Click [Next] to begin the new zone creation wizard
5. Accept the option to create a new forward lookup zone, but uncheck the option to store the data in Active Directory (at this time).



New Zone Wizard

Zone Type

The DNS server supports various types of zones and storage.

Select the type of zone you want to create:

● Primary zone
Creates a copy of a zone that can be updated directly on this server.

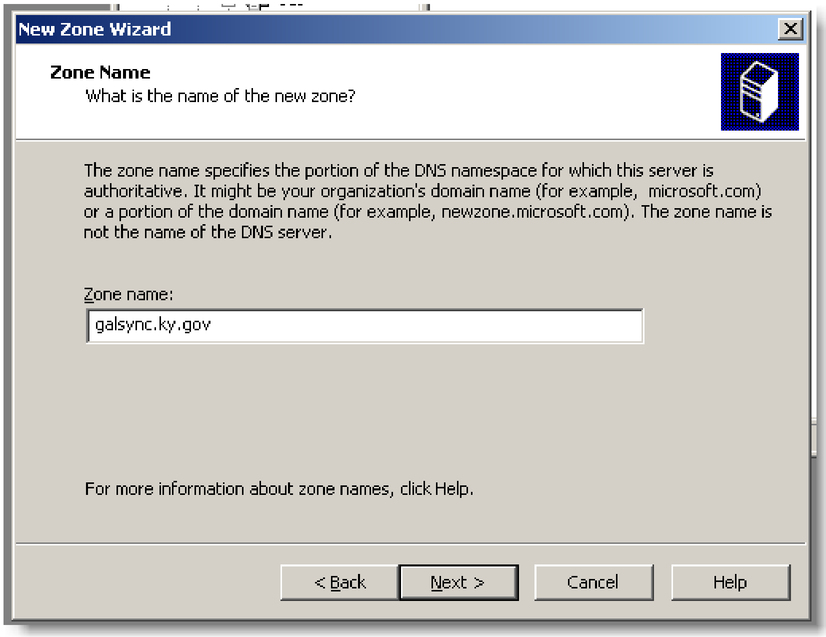
○ Secondary zone
Creates a copy of a zone that exists on another server. This option helps balance the processing load of primary servers and provides fault tolerance.

○ Stub zone
Creates a copy of a zone containing only Name Server (NS), Start of Authority (SOA), and possibly glue Host (A) records. A server containing a stub zone is not authoritative for that zone.

☐ Store the zone in Active Directory (available only if DNS server is a domain controller)

Click [Next] to proceed.

6. Name the zone ‘GALSync.ky.gov’ and click [Next]



New Zone Wizard

Zone Name

What is the name of the new zone?

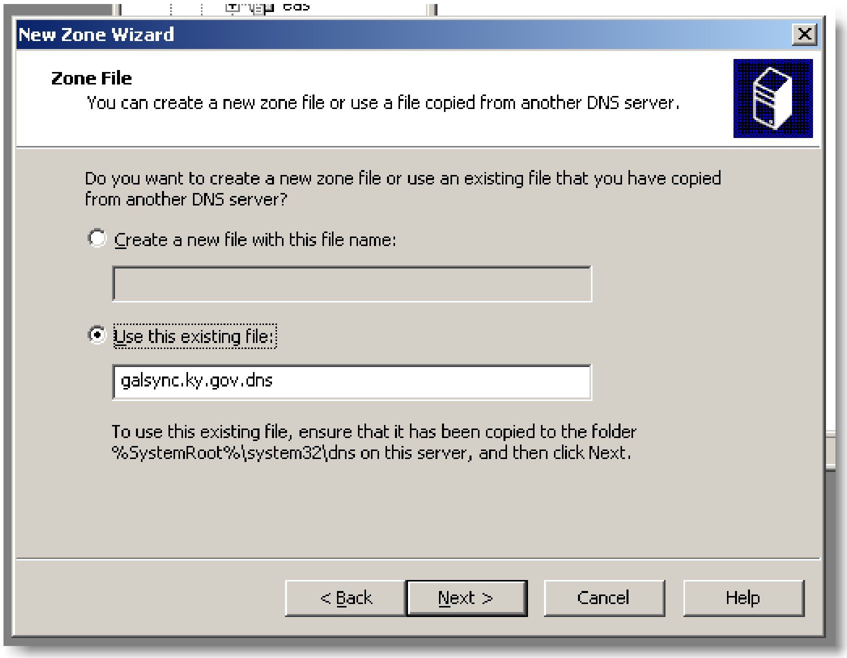
The zone name specifies the portion of the DNS namespace for which this server is authoritative. It might be your organization's domain name (for example, microsoft.com) or a portion of the domain name (for example, newzone.microsoft.com). The zone name is not the name of the DNS server.

Zone name: galsync.ky.gov

For more information about zone names, click Help.

Click [Next] to proceed.

7. Select the option for using the existing ‘galsyn.ky.gov’ zone file. Before proceeding to the next step, open the ‘DNS’ folder on the ‘COK GALSync Resources’ CD and copy the ‘GALSync.ky.gov.dns’ file from the CD to the ‘C:\windows\system32\dns’ folder on the DNS server.



New Zone Wizard

Zone File

You can create a new zone file or use a file copied from another DNS server.

Do you want to create a new zone file or use an existing file that you have copied from another DNS server?

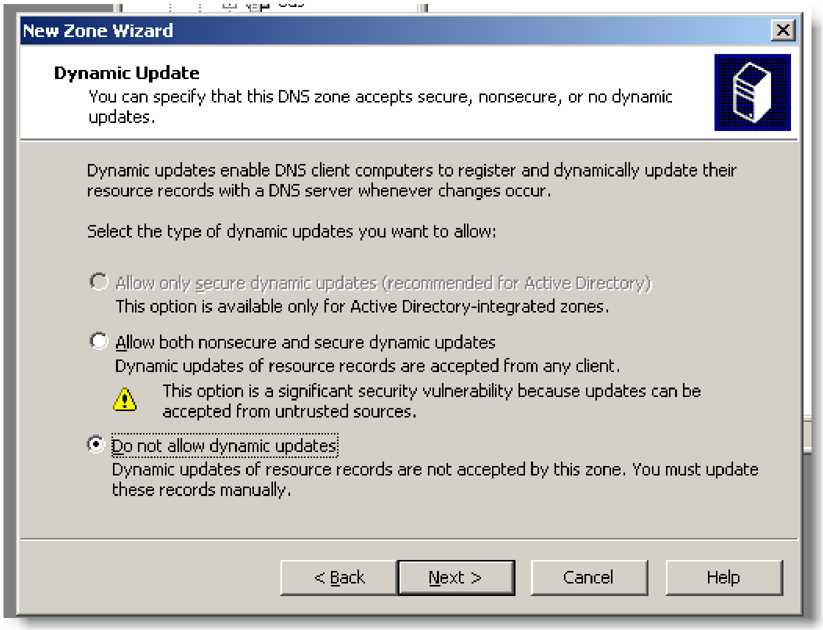
○ Create a new file with this file name:

● Use this existing file: galsync.ky.gov.dns

To use this existing file, ensure that it has been copied to the folder %SystemRoot%\system32\dns on this server, and then click Next.

Click [Next] to proceed.

8. Verify that dynamic updates are turned off



Dynamic Update

You can specify that this DNS zone accepts secure, nonsecure, or no dynamic updates.

Dynamic updates enable DNS client computers to register and dynamically update their resource records with a DNS server whenever changes occur.

Select the type of dynamic updates you want to allow:

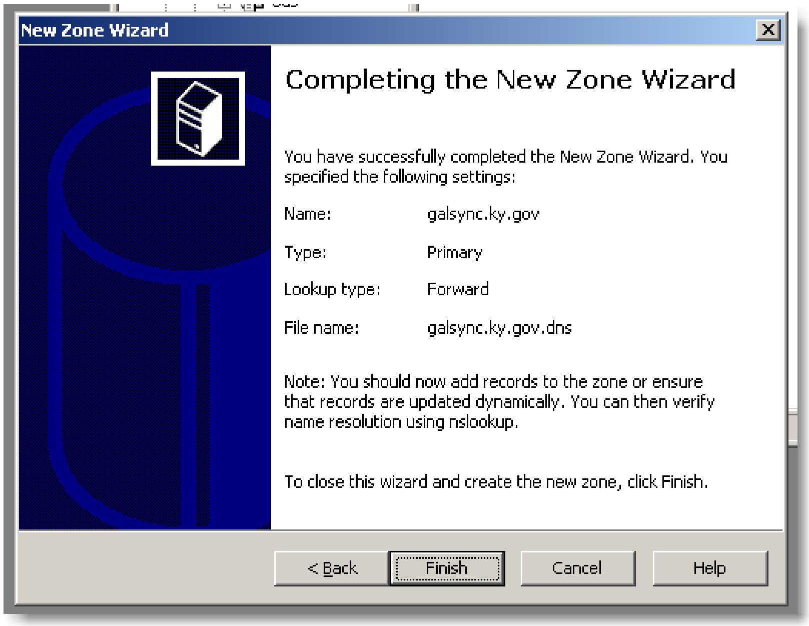
○ Allow only secure dynamic updates (recommended for Active Directory)
This option is available only for Active Directory-integrated zones.

○ Allow both nonsecure and secure dynamic updates
Dynamic updates of resource records are accepted from any client.
⚠ This option is a significant security vulnerability because updates can be accepted from untrusted sources.

● Do not allow dynamic updates
Dynamic updates of resource records are not accepted by this zone. You must update these records manually.

Click [Next] to proceed.

9. Click [Finish] to complete the Zone Creation wizard.



Completing the New Zone Wizard

You have successfully completed the New Zone Wizard. You specified the following settings:

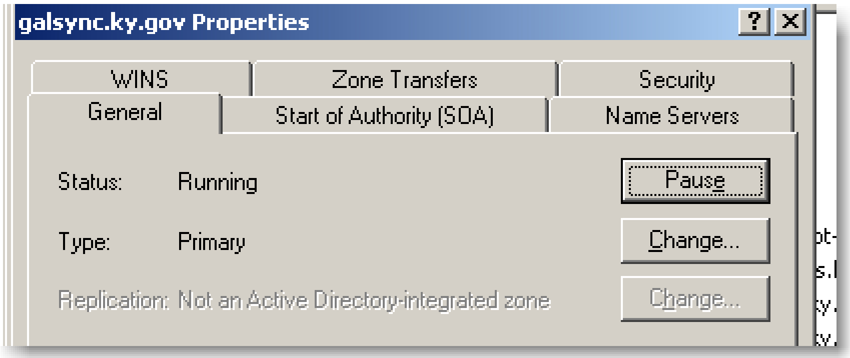
Name:	galsync.ky.gov
Type:	Primary
Lookup type:	Forward
File name:	galsync.ky.gov.dns

Note: You should now add records to the zone or ensure that records are updated dynamically. You can then verify name resolution using nslookup.

To close this wizard and create the new zone, click Finish.

10. Once the zone is created and loaded from the file copied from the CD, you should be able to click on the zone in the DNS manager to see the data that was imported from the text file. Assuming that the import worked as expected, right-click on the zone and open its properties dialog:

On the 'General' tab click the [Change] button to bring up the dialog to allow the change from a standard (file-based) to an Active Directory-integrated zone:

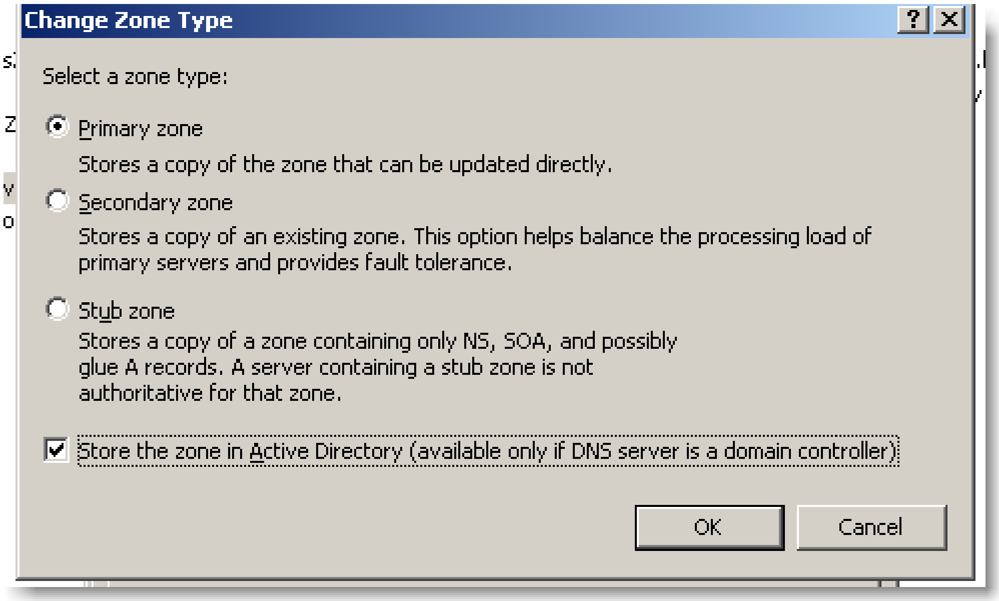


Status: Running

Type: Primary

Replication: Not an Active Directory-integrated zone

11. Select the checkbox to turn on Active Directory storage for the zone data, and click [OK}



Select a zone type:

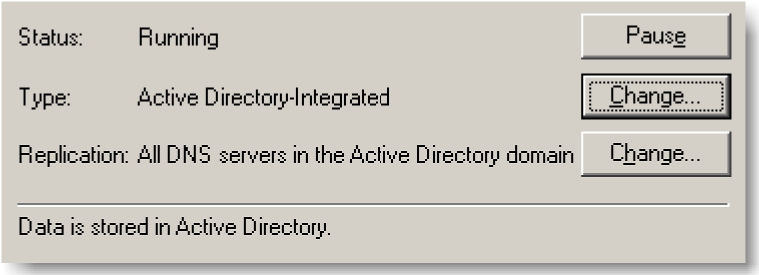
● Primary zone
Stores a copy of the zone that can be updated directly.

○ Secondary zone
Stores a copy of an existing zone. This option helps balance the processing load of primary servers and provides fault tolerance.

○ Stub zone
Stores a copy of a zone containing only NS, SOA, and possibly glue A records. A server containing a stub zone is not authoritative for that zone.

☑ Store the zone in Active Directory (available only if DNS server is a domain controller)

12. Verify that the data is now stored in Active Directory



Status: Running

Type: Active Directory-Integrated

Replication: All DNS servers in the Active Directory domain

Data is stored in Active Directory.

and click [OK] to save the changes to the zone.

Exchange 2003

Recipient Policy

If your production Exchange 2003 environment is configured with multiple recipient policies that use specific LDAP filters to evaluate different objects, then ensure that you have a recipient policy that will apply to the synchronized contacts. By default, the synchronized contacts will be evaluated by the 'Default Policy' (which is the lowest-valued policy). If your default policy will not evaluate the synchronized contacts (due to visibility requirements) and no other policy will evaluate the synchronized contacts, then be prepared to create a special recipient policy for the synchronized contact objects.

If this is the case, then modification of the attribute flow rules on the IIFP server will also be necessary, so that the IIFP is configured to flow a specific attribute/value pair (of your designation) so that the synchronized contacts will meet at least one recipient policy filter condition and their 'showInAddressBook' attribute will be updated accordingly. Note that this information will not be flowed back to the GALSync forest – this is done only to ensure that the contacts work within your environment.

Note

Failure of the RUS to update the 'showInAddressBook' attribute on the synchronized contacts will prevent the synchronized contacts from being visible in any Exchange 2003 address list (Global, Offline, etc.)

Recipient Update Service (RUS)

If your production Active Directory is configured in a multi-domain environment then ensure that you have a recipient update service (RUS) configured appropriately within the Exchange System Manager (ESM) to update the synchronized contact objects from the GALSync forest. Although the contacts themselves will not have their e-mail address information updated, the RUS is required to evaluate recipient policy information so that the 'showInAddressBook' attribute is populated correctly on the contact objects such that they show up correctly in the appropriate address lists.

Backup and Recovery of the GALSync Server

This section details the high-level process by which to backup and restore the GALSync server.

General Information

Since the GALSync server is really a client/server application, there are a several components that must be accounted for to completely back up the GALSync server's configuration:

- SQL databases
- IIFP MA configuration
- IIFP encryption keys
- Extension code

Each of these components comprise a portion of the total GALSync server configuration and all must be backed up in order to return the server to its production configuration after a disaster.

This section covers these topics at a high level; much more detailed information can be found in the Microsoft **"Maintaining the MIIS 2003 Database"** whitepaper, which is located at the following location on the Microsoft website - http://www.microsoft.com/downloads/details.aspx?FamilyID=5f50fea4-b876-49ef-a9b9-593e48b5d640&DisplayLang=en and is also located on the "COK GALSync Resources" CD ISO file in the 'Documents' Folder, along with a copy of this document file.

Although the information in this section will allow you to perform an initial backup and a restoration of your server, please review the aforementioned Microsoft whitepaper, as the long-term care and maintenance of the SQL database is covered in this document and is outside the scope of this implementation.

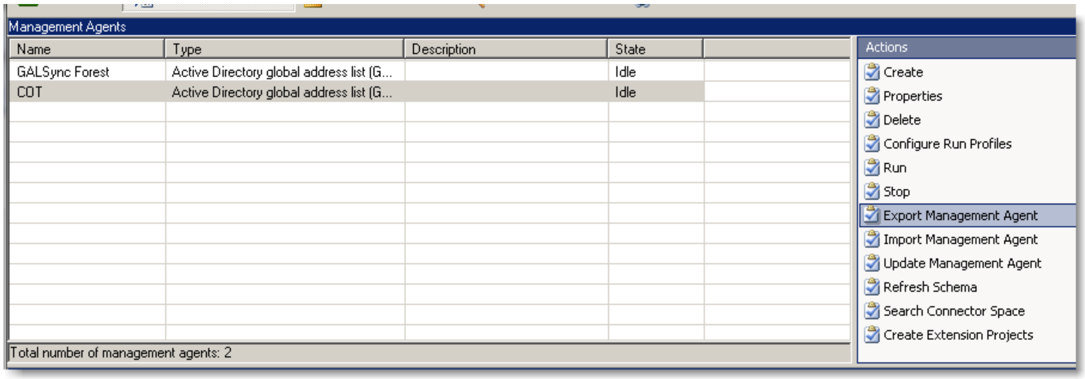
Backup

The SQL 2005 server that runs on the IIFP server should be configured with a maintenance plan to automatically optimize and backup the SQL database to a spindle on the IIFP server and then secure the backup to some location on the network or take it to tape for archival purposes.

The information in the IIFP database is encrypted and can only be decrypted with the server's encryption key, so restoring the database to another location or server without the key will not be fruitful.

Also be sure to export the Management Agents to XML files and then keep these XML files in the same location as the encryption key. Exporting a MA can be performed as follows:

1. Open the Identity Manager and switch to the 'Management Agents' context.
2. Either right-click on the MA that you wish to export and select 'Export Management Agent' from the context menu, or select 'Export Management Agent' from the Actions menu on the right-hand side of the screen, as shown below:



Management Agents

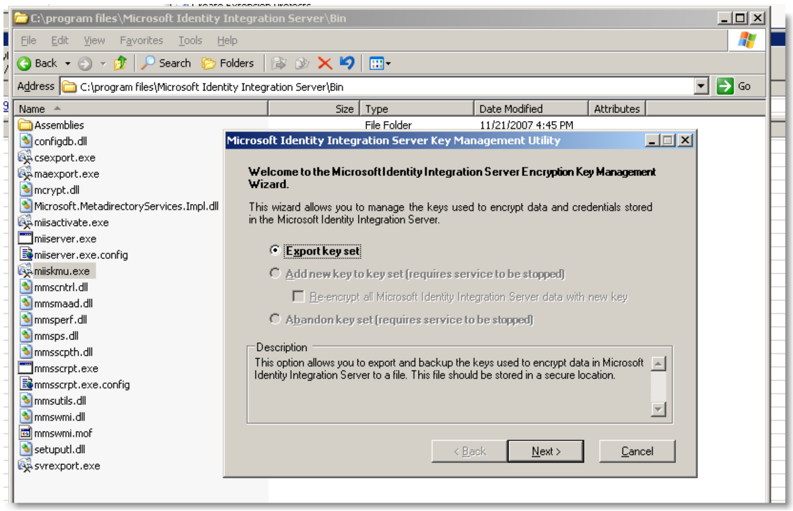
Name	Type	Description	State
GALSync Forest	Active Directory global address list (G...		Idle
COT	Active Directory global address list (G...		Idle

Total number of management agents: 2

3. The normal Windows 'Save As' dialog will then appear; name the export XML file appropriately and then click [Save] to begin the exporting process.

Backup of the encryption key can be performed as follows:

1. Open the 'c:\program files\microsoft identity integration server\bin' folder and execute the 'miiskmu.exe' file



C:\program files\Microsoft Identity Integration Server\Bin
File
Edit
View
Favorites
Tools
Help
Back
Search
Folders
Address
C:\program files\Microsoft Identity Integration Server\Bin
Go

Name	Size	Type	Date Modified	Attributes
Assemblies		File Folder	11/21/2007 4:45 PM	
configdb.dll				
csexport.exe				
maexport.exe				
mcrypt.dll				
Microsoft.MetadirectoryServices.Impl.dll				
miisactivate.exe				
miiserver.exe				
miiserver.exe.config				
miiskmu.exe				
mmscntrl.dll				
mmsmaad.dll				
mmsperf.dll				
mmsps.dll				
mmsscpth.dll				
mmsscrpt.exe				
mmsscrpt.exe.config				
mmsutils.dll				
mmswmi.dll				
mmswmi.mof				
setuputl.dll				
svrexport.exe				

Microsoft Identity Integration Server Key Management Utility

Welcome to the Microsoft Identity Integration Server Encryption Key Management Wizard.

This wizard allows you to manage the keys used to encrypt data and credentials stored in the Microsoft Identity Integration Server.

● Export key set

○ Add new key to key set (requires service to be stopped)

□ Re-encrypt all Microsoft Identity Integration Server data with new key

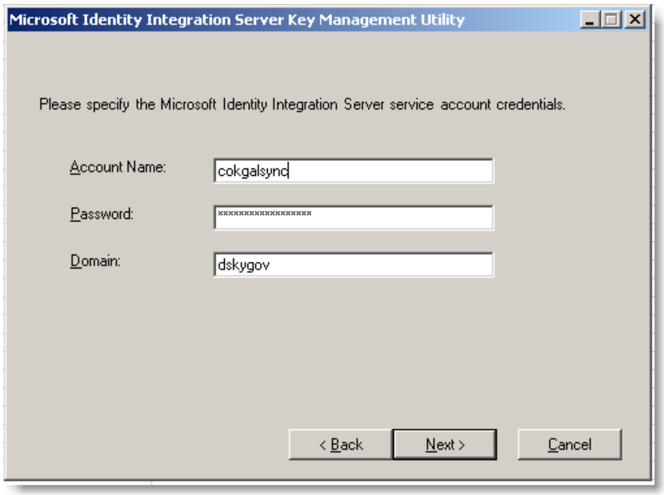
○ Abandon key set (requires service to be stopped)

Description

This option allows you to export and backup the keys used to encrypt data in Microsoft Identity Integration Server to a file. This file should be stored in a secure location.

2. Click [Next]

3. Specify the IIFP service account credentials (and NETBIOS domain name!) and click [Next]



Please specify the Microsoft Identity Integration Server service account credentials.

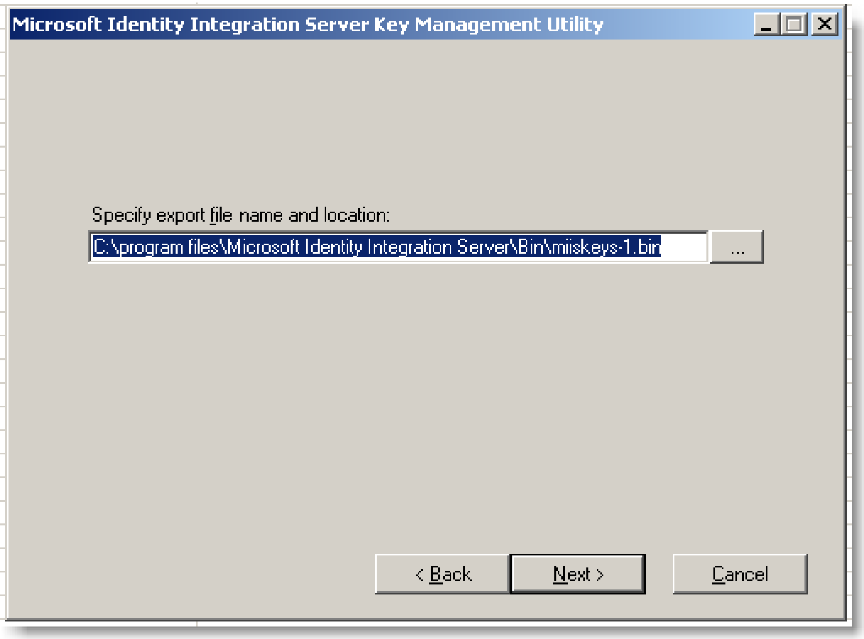
Account Name: cokgalsync

Password: ******************

Domain: dskygov

Microsoft Identity Integration Server Key Management Utility
< Back
Next >
Cancel

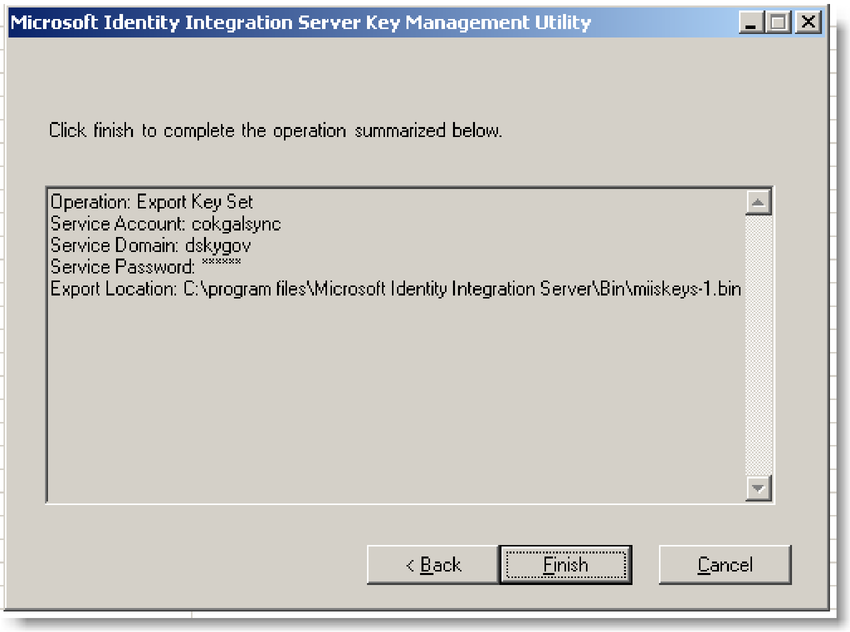
Specify a location and name for the exported key set file



Specify export file name and location: C:\program files\Microsoft Identity Integration Server\Bin\miiskeys-1.bin

Microsoft Identity Integration Server Key Management Utility
...
< Back
Next >
Cancel

4. Click [Finish] to begin the exporting process



Microsoft Identity Integration Server Key Management Utility

Click finish to complete the operation summarized below.

```
Operation: Export Key Set
Service Account: cokgalsync
Service Domain: dskygov
Service Password: ******
Export Location: C:\program files\Microsoft Identity Integration Server\Bin\miiskeys-1.bin
```

5. Click [Close] to exit the wizard and open the folder where the exported encryption key file was created, and move the key file to a safe location!

Restoration

If your GALSync server befalls some type of disaster, or it becomes necessary to move it to another server, then the server will have to be restored from its last good backup in order to return it to service and 'catch-up' on the synchronization process.

The full restoration process is as follows (all procedures must be performed logged on as the GALSync service account):

1. Bring up a new server that meets the specifications as outlined in this document
2. Install SQL 2005 standard edition
3. Install SQL 2005 SP2
4. Restore the last backup of the 'MicrosoftIdentityIntegrationServer' database that you have.
5. Install the IIFP from the 'COK GALSync Resources' CD
6. During the installation, the setup program will detect that an existing MIIS/IIFP database is on the server and will prompt you as to whether or not you want to restore the configuration associated with that database. Select [Yes] to do so.
7. Run the 'miisactivate' utility to restore the encryption key set
8. Log off/on to the server
9. Install the 'KB893015' patch to the IIFP server from the 'COK GALSync Resources' CD
10. Ensure the MIIS services are started and go into the Identity Manager and verify that all prior information (run history, MA's, etc.) are listed. If the restore process completed successfully, everything in its entirety should be there and the server should be ready to continue service.
11. Update the 'GALSync.dll' file from the 'COK GALSync Resources' CD and copy it over the existing 'GALSync.dll' in the 'c:\program files\microsoft identity integration server\extensions' folder
12. Ensure that provisioning is turned on in the server options.

Automating the Synchronization Process

Since the GALSync server runs at each local agency, there is no ‘centralized’ GALSync process that has to be accounted for in order for the entire procedure to work correctly. As such, each agency is free to determine what import and export schedule (frequency, time of day, day of week, etc.) works best for them.

As with any synchronization solution, the value is provided in the automation of the process and the currency of the data. As such, COT advises synchronize on a semi-regular basis (at least once per week) if for no other reason than to provide the rest of the Commonwealth with your updated information.

COT recommends that you time your exports during the day such that the exported information has replicated throughout your environment *BEFORE* the OAB (Offline Address Book) files are rebuilt on the Exchange server. This recommendation is done such that users download the most recent OAB changes every morning and their ‘view’ of the GAL is as up-to-date as possible.

If you are following a ‘once-a-week’ schedule, then the weekend (Sunday during the day) is a perfect time for the exports. If you are following a daily schedule, then time the exports such that they complete before the OAB rebuild for that day begins.

The IIFP supports running the MA’s manually at your discretion. However, if you wish to automate the running of the MA’s you will need to install the MIIS Resource Kit utilities. You can download the newest version of the utilities from the Microsoft ILM website, or just install them directly from the ‘IIFP\Resource Kit’ folder on the ‘COK GALSync Resources CD’.

Once the utilities are installed, open the installation folder (C:\Program Files\Microsoft Identity Integration Server 2003 Resource Tool Kit\) and find the ‘masequenceconfiguration.exe’ file. Run this utility and from here the sequence of the management agents can be configured. Once the sequence is configured correctly, then save the sequence as an XML file and run the command-line program ‘masequencer.exe’ and use the XML file as input to run the MA’s in the order you configured.

Once this configuration is solid, then create a scheduled task to run ‘masequencer’ with the final XML configuration file to fully automate the GAL Synchronization process.

Performing your first Full GALSync

As soon as you have your server set up and configured, you should be ready to perform your first GALSync. There are a few items to keep in mind and you should consider the following **before** jumping right into the process and performing your first synchronization.

- Plan on performing your first synchronization after-hours or on a weekend – the time required for the initial setup of the server and the preparation of Active Directory will likely necessitate some uninterrupted time to think through all of the processes and procedures.
- Ensure that you have your GALSync forest credentials from COT
- Ensure that you can resolve the 'gs1.galsync.ky.gov' and the 'gs2.galsync.ky.gov' servers from the GALSync server and that you can telnet to ports 389 and 88 to both servers.
- Prepare your users for the ramifications of the first synchronization cycle. Things to make them aware of consist, but are not limited to, the following:
    - The names of the state contacts they are used to seeing in the GAL for a specific user may change or be formatted slightly differently
    - Contacts and distribution lists in their personal address books will not be altered by this process, but may not work after the first synchronization. Each user should be prepared to update their own PAB with the new synchronized contacts if they wish to continue using PAB's.
    - Replying to a message from a state contact that was created before the first synchronization process *MAY* not work and *MAY* result in a NDR. Every effort has been put forth to keep this from happening but the possibility does exist. Once the user selects the same person from the GAL and forwards the old message to them or creates a new message to them, this will be the last time such an NDR is seen.
    - Distribution list membership in the GAL may be inconsistent for a few days and they should allow a day or two for full membership to be re-established.
- All existing mail-enabled state contacts that correspond to e-mail addresses outside your agency should be deleted from Active Directory and force replication between the domain controllers in the domain where these contacts were located.
- All existing distribution lists in the GAL that currently have mail-enabled state contacts will see their membership modified (and those contacts removed) once the existing contacts are deleted before the first sync is performed. Once the first sync and export finished and these contacts are re-created, they will have to be added back to the distribution lists in question.

Note

This 're-add' process will only have to be done for the initial sync. Distribution list membership is maintained from that point going forward.

Once you are ready to perform the synchronization, follow this procedure for running the management agents:

1. Active Directory forest MA – perform a full import (stage only) of all directory partitions that contain mailbox-enabled users in your forest
2. GALSync forest MA – perform a full import (stage only)
3. Active Directory forest MA – perform a full synchronization
4. GALSync forest MA – perform a full synchronization
5. Active Directory forest MA – perform an export
6. GALSync forest MA – perform an export

7. **This step is important – make sure the Exchange RUS runs against your contact objects to make sure they show up in the GAL!!**

8. Active Directory forest MA – perform a delta import (stage only) of the directory partition that contains the contacts
9. Active Directory forest MA – perform a delta synchronization
10. Active Directory forest MA – perform an export
11. Active Directory forest MA – perform a delta import (stage only) of the directory partition that contains the contacts
12. GALSync forest MA – perform a delta import (stage only)

The 'Day-toDay' GALSync process

Even though each agency is in control of how often they 'push' their data to the GALSync forest and how often they 'pull' the data about other agencies from the GALSync forest, the true value of such a solution is in the

Although your needs may vary, the following sequence of MA runs should be followed for 'day-to-day' running of the synchronization process:

1. Active Directory forest MA – perform a delta import (stage only) of each directory partition
2. Active Directory forest MA – perform a delta synchronization of each directory partition
3. GALSync forest MA – perform a delta import (stage only)
4. GALSync forest MA – perform a delta synchronization
5. Active Directory forest MA – perform an Export
6. GALSync forest MA – perform an export

7. **This step is important – make sure the Exchange RUS runs against your contact objects to make sure they show up in the GAL!!**

8. Active Directory forest MA – perform a delta import (stage only) of the directory partition that contains the contacts
9. Active Directory forest MA – perform a delta synchronization
10. Active Directory forest MA – perform an Export
11. Active Directory forest MA – perform a delta import (stage only) of the directory partition that contains the contacts

Note

Be sure that your exports are timed such that the domain controllers in your forest have enough time to replicate the new contacts and before the Exchange 2003 server rebuilds its Offline Address Book so that all new contacts synchronized on a given day are available to all of your Outlook users (both online and cached-mode) the next day!

Appendix A – Process for Requesting and Establishing GALSync

History

During the Exchange 5.5 era agencies using the Kentucky Information Highway (KIH) could exchange the Global Address List (GAL) with the Executive Branch. This process was performed manually, tedious and time consuming. The GAL swap process was an official means for agencies not hosted on the Executive Branch's email system an avenue to update their system to show contacts from other agencies. All information included in the GAL is the property of and owned by the agencies.

Present Day

The installation and upgrade to Exchange 2003 has put an end to the manual process previously used to update the GAL. We have an opportunity to take a once manual process and turn it into an automated process for all areas that qualify to participate.

Method

The automation of swapping GALs will be accomplished by using Identity Integration Feature Pack (IIFP) which is the scaled-down version of Microsoft Identify Integration Server (MIIS). IIFP provides all of the functionality to accomplish the needed business goals while providing an tremendous licensing savings to each participating agency (the IIFP is free). The agency IIFP will run an automated synchronization cycle on a weekly basis to perform this synchronization with the GALSync forest.

The Executive Branch's Commonwealth Office of Technology will provide and maintain the staging (GALSync) forest, which is compiled of mail-enabled contacts from the participating agencies. It will be up to each participating agency to provide their own IIFP/SQL server and configuration of this server that will provide the correct information to the GALSync forest.

Requirements

The qualifications to participate in the GAL Exchange via IIFP are as follows:

- An Agency's GAL and its published data is their property and the use of it by someone else needs to be approved by the proper management of that Agency.

- An agency needs to be part of the Commonwealth's network which has been referred to as "The Kentucky Information Highway" per KRS 45A.605.

COT Responsibilities - COT will be responsible for the implementation of the first IIFP server and staging forest that all participants will use to house their contacts (and will incur any hardware, software and ongoing maintenance/monitoring costs). COT will maintain the hardware and software to insure proper functionality of the staging forest server and will make every effort to ensure that the forest is available at all times. If there is any scheduled downtime, COT will notify you (sent to the agency contact e-mail address submitted on the Acknowledgement Letter) of any downtime as far in advance as possible.

Participants Responsibilities - All participants understand they are responsible for acquiring their own IIFP server and any configuration that will be required to achieve the exchanging of GAL contacts. The agencies will be responsible for any support required to implement this solution as well as any ongoing support that may be required for the proper functionality of their IIFP server.

Required Fields for all GALSync Contacts

By participating in the GALSync program, your agency agrees to publish the following information to all other participating agencies. By participating in the GALSync program, your agency will automatically 'learn' the same information about all other participating agencies, as well. The Active Directory attribute names are given in red for your convenience.

Synchronized User Information	**Active Directory Attribute Name**
First Name	givenName
Last Name	sn
Display Name	displayName
E-mail Alias	mailNickname
E-mail Address	mail
Address	streetAddress
City	l
State	st
Zip Code	postalCode
Title	title
Company	company
Department	department
Office	physicalDeliveryOfficeName
Phone	telephoneNumber

The Commonwealth Office of Technology will require a Letter of Acknowledgement (see next page) that all of the above requirements will be met and abided by.

Commonwealth of Kentucky GALSync Authorization and Letter of Acknowledgement

By completing and submitting this letter to the Commonwealth Office of Technology, you hereby declare the following:

The agency which I represent wishes to participate in the COT-sponsored 'Global Address List Synchronization Program' - hereafter referred to as 'GALSync'. By participating in this program, this agency hereby releases COT from any responsibility for such data that is synchronized and any adverse affect that is created or experienced by following the instructions included in this document.

COT has tested – to the best of its ability – all instructions, procedures, events and outcomes noted within, but cannot be held responsible for unforeseen circumstances and configurations within your agency. The participating agency has the responsibility to prepare their environment for this program, and by requesting to participate in such program, you deem yourself capable and willing to follow these directions (in their entirety) and to be able to recover your environment in the event of an unsuccessful implementation.

In order to participate in the GALSync program, COT requires the following information from your agency:

Description	Value
Agency Name	
Agency Contact Name	
Agency Contact E-mail address	
Dedicated 'Public' IP address from Agency firewall for the IIFP server	

Once this information has been submitted to COT, then you will receive back a copy of this form along with your agency-specific credentials and connectivity information needed to access the GALSync forest to perform GALSync.

These credentials will **only allow your agency to update your agency's information into the GALSync forest**, and to **read the information from all other participating agencies**. Under these conditions, it is very important to ensure that the attributes that will be published to the other participants GAL contains only the information that your agency deems non-sensitive and has the legal authority to share with other participating agencies.

Agency Representative

Signed By: ____

This _____ day of _________________, _________

COT Representative

Signed By: ____

This _____ day of _________________, _________

Appendix B - How to grant the "Replicating Directory Changes" permission for the Microsoft Metadirectory Services ADMA service account

View products that this article applies to.

Article ID : 303972
Last Review : February 23, 2007
Revision : 5.1

This article was previously published under Q303972

On This Page

SUMMARY

When discovering objects in Active Directory using the Active Directory management agent (ADMA), the account that is specified for connecting to Active Directory must either have Domain Administrative permissions, belong to the Domain Administrators group, or be explicitly granted Replicating Directory Changes permissions for every domain of the forest that this management agent accesses. This article describes how to explicitly a grant a user account the Replicating Directory Changes permissions on a domain.

Note In Windows Server 2003, the name of this permission changed to "Replicate Directory Changes."

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MORE INFORMATION

The Replicating Directory Changes permission, known as the Replicate Directory Changes permission in Windows Server 2003, is an Access Control Entry (ACE) on each domain naming context. You can assign this permission by using the ACL editor or the Adsiedit support tool in Windows 2000.

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Setting permissions by using the ACL editor

1. Open the Active Directory Users and Computers snap-in
2. On the **View** menu, click **Advanced Features**.
3. Right-click the domain object, such as "company.com", and then click **Properties**.
4. On the **Security** tab, if the desired user account is not listed, click **Add**; if the desired user account is listed, proceed to step 7.
5. In the **Select Users, Computers, or Groups** dialog box, select the desired user account, and then click **Add**.
6. Click **OK** to return to the **Properties** dialog box.
7. Click the desired user account.
8. Click to select the **Replicating Directory Changes** check box from the list.
9. Click **Apply**, and then click **OK**.
10. Close the snap-in.

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Setting permissions by using Adsiedit

Warning Using Adsiedit incorrectly can cause serious problems that may require you to reinstall your operating system. Microsoft cannot guarantee that problems resulting from the incorrect use of Adsiedit can be solved. Use Adsiedit at your own risk.

1. Install the Windows 2000 Support tools if they have not already been installed. For more information about how to install the Windows 2000 Support Tools, click the following article number to view the article in the Microsoft Knowledge Base:

   301423 How to install the Windows 2000 Support Tools to a Windows 2000 Server-based computer

2. Run Adsiedit.msc as an administrator of the domain. Expand the Domain Naming Context (Domain NC) node. This node contains an object that begins with "DC=" and reflects the correct domain name. Right-click this object, and then click **Properties**.

3. Click the **Security** tab.

4. If the desired user account is not listed, click **Add**, otherwise proceed to step 8.

5. In the **Select Users, Computers, or Groups** dialog box, select the desired user account, and then click **Add**.

6. Click **OK** to return to the **Properties** dialog box.

7. Click **Apply**, and then click **OK**.

8. Select the desired user account

9. Click to select the **Replicating Directory Changes** check box.

10. Click **Apply**, and then click **OK**.

11. Close the snap-in.

Note Using either method, setting the Replicating Directory Changes permission for each domain within your forest enables the discovery of objects in the domain within the Active Directory forest. However, enabling discovery of the connected directory does not imply that other operations can be performed.

To create, modify, and delete objects within Active Directory using a non-administrative account, you may need to add additional permissions as appropriate. For example, for Microsoft Metadirectory Services (MMS) to create new user objects in an Organizational Unit (OU) or container, the account that is being used must be explicitly granted the Create All Child Objects permission, as the Replicating Directory Changes permission is not sufficient to allow the creation of objects.

In a similar fashion, the deletion of objects requires the Delete All Child Objects permission.

It is possible that there are limitations on other operations, such as attribute flow, depending on the specific security settings that are assigned to the object in question, and whether or not inheritance is a factor.

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APPLIES TO

- Microsoft Metadirectory Services 2.2 Service Pack 1
- Microsoft Metadirectory Services 2.2 Service Pack 1
- Identity Integration Feature Pack for Microsoft Windows Server Active Directory
- Microsoft Identity Integration Server 2003 Enterprise Edition

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